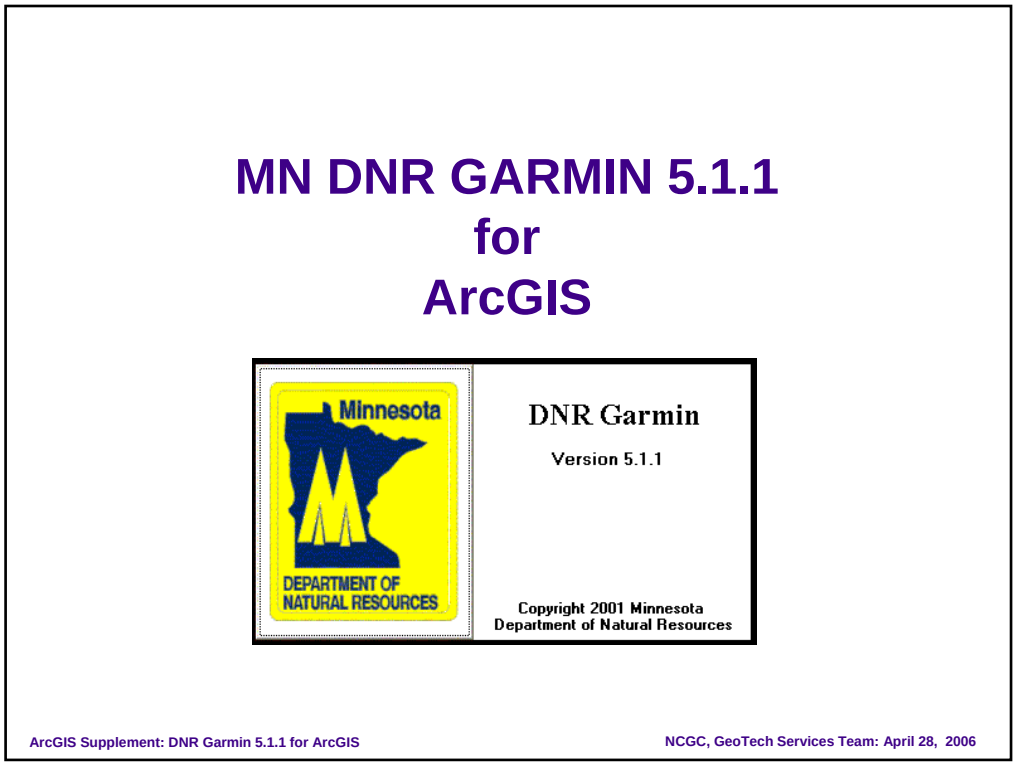
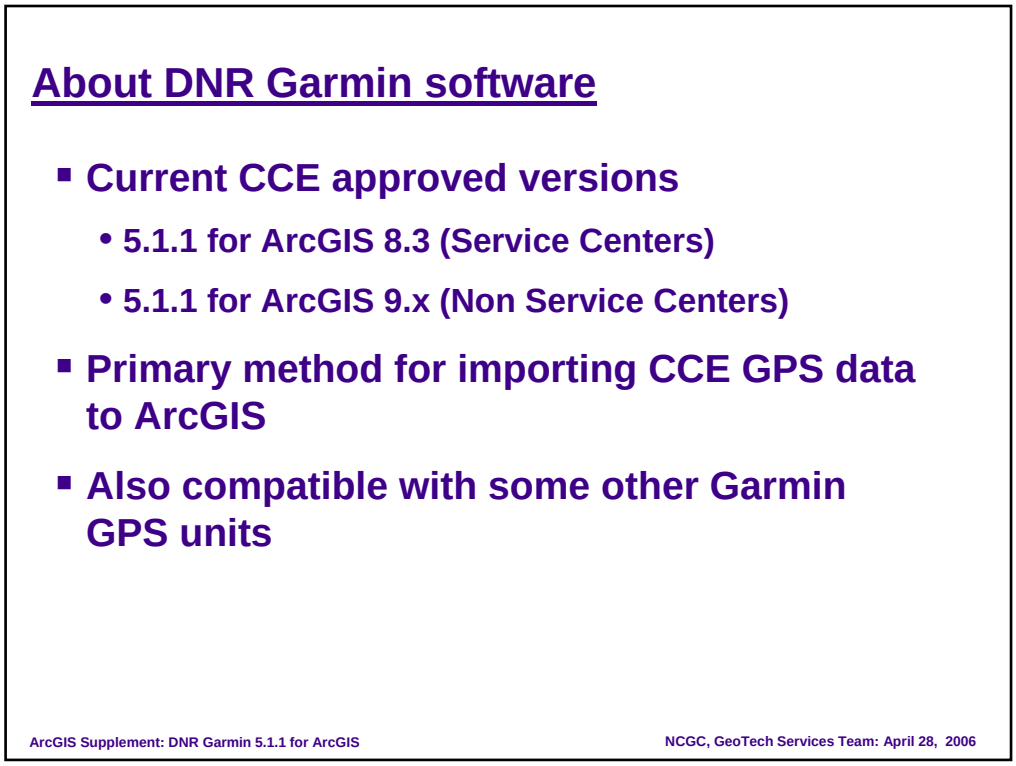


MN DNR Garmin 5.1.1 for ArcGIS

Welcome to MN DNR Garmin 5.1.1 for ArcGIS.

MN DNR Garmin is a software tool that has been used by NRCS Service Center offices since 2001. It is approved for use in the Common Computing Environment (CCE).

This is the fourth release of the software to the Service Center Agencies. Each revision gets a little better – let's see what the 5.1.1 release offers…



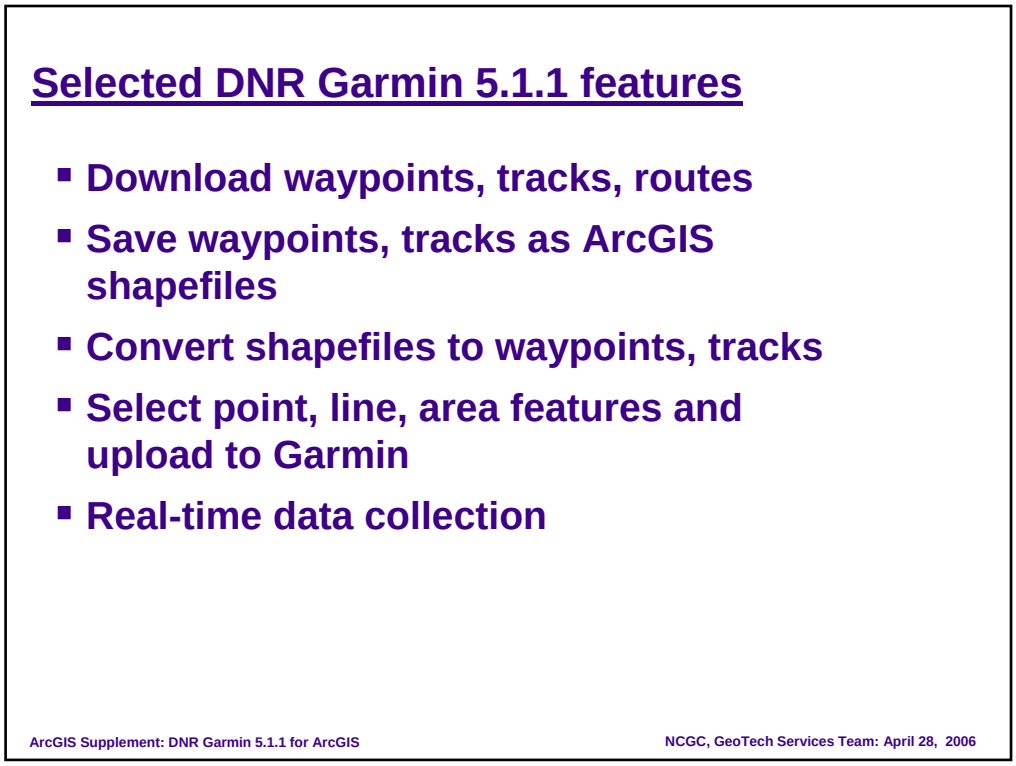
About DNR Garmin software

DNR Garmin is the CCE approved software for downloading and uploading GPS (Global Positioning System) data to and from ArcGIS. The GPS we're primarily interested in is the Garmin Map 76 (CCE Approved). DNR Garmin 5.1.1 works with other Garmin receivers but not all.

The following Garmin GPS Models have been tested successfully with the DNR Garmin Extension: Garmin 12, 12XL, 12CX, 12Map, eTREX Vista, eTREX Legend, 76, MAP76, MAP76S, MAP76C, MAP168 Sounder, II, II+, III, III+, 38, 45, 196, Map 296. The following Garmin GPS Models will not work: Garmin 89, Garmin IQue.

DNR Garmin software was written by the Minnesota Department of Natural Resources (MN DNR). For more information go to:

http://www.dnr.state.mn.us/mis/gis/index.html.



DNR Garmin 5.1.1 features

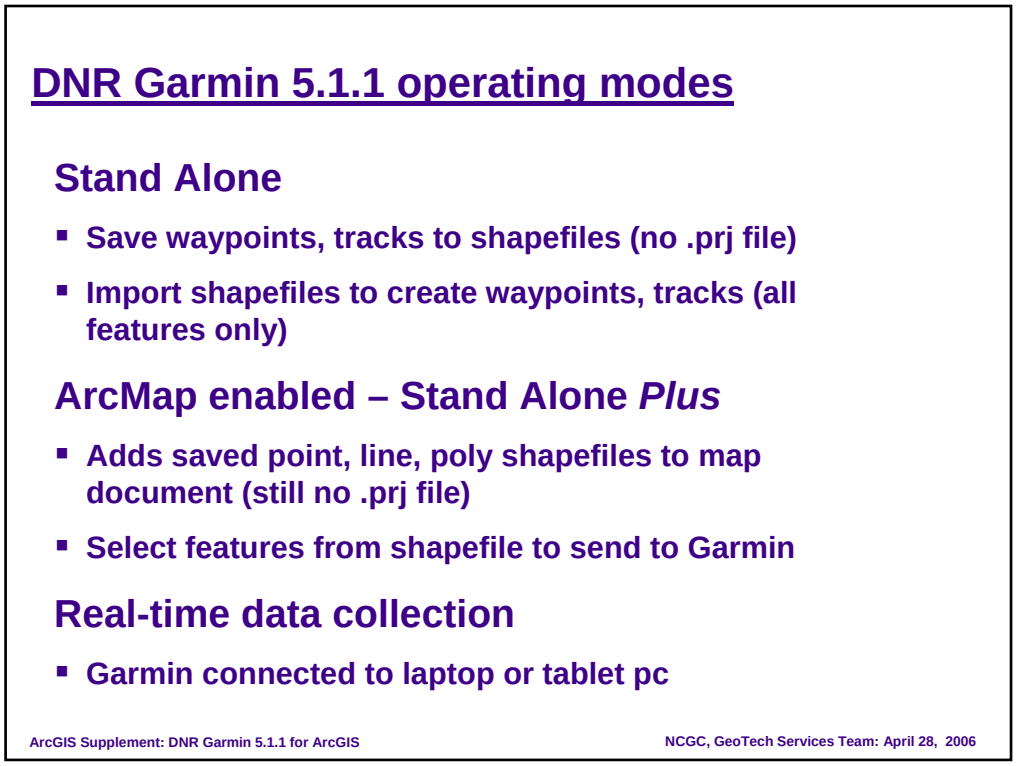
DNR Garmin 5.1.1 downloads waypoints, track logs, and routes from the Garmin Map 76 receiver. Waypoints are typically collected on single features such as wellheads, or water pumps. Track logs are collected to describe area features – typically curvilinear – such as new ponds, or curvilinear fields. Routes are collections of waypoints that are useful for navigation.

DNR Garmin can export downloaded waypoint and track log data to ArcGIS shapefiles. If you are running ArcGIS 8.3 the software will automatically add the new shapefile to your map document. Data are downloaded to an edit table. You select the data to export to shapefile format. There is also an option to export data to a geodatabase. The option does not appear to work at this time.

Point, line, and area features can be selected and uploaded to the Garmin Map 76 through DNR Garmin 5.1.1. Individual features can be selected or entire shapefiles can be uploaded. This option is particularly useful to return to sites for periodic monitoring.

DNR Garmin has a real-time data collection capability. You can connect your GPS to your laptop or tablet computer and collect data while in the field. The data can go to the edit table or directly to a shapefile. Texas NRCS uses this capability extensively for planning rangeland treatments.

DNR Garmin also has the ability to add shape attributes such as length and area to shapefiles as they are being created and adding image hot linking. The shape attributes do not appear to work very well at this version and the image hot linking may be more easily done in ArcGIS.



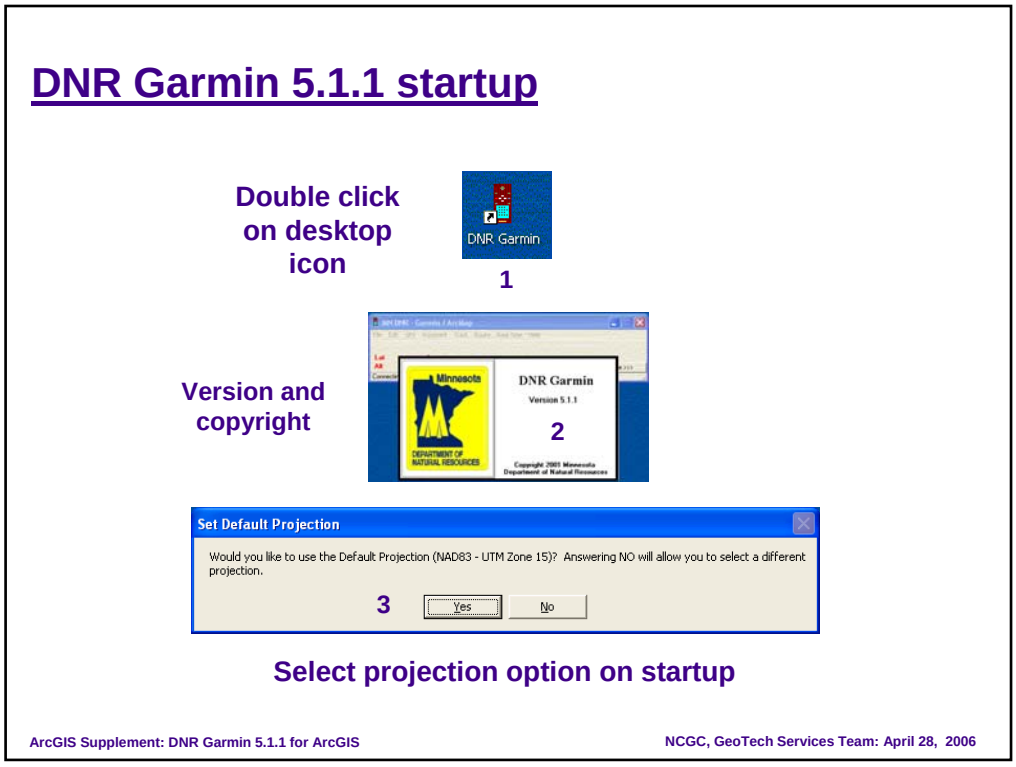
DNR Garmin 5.1.1 operating modes

The DNR Garmin software has three operating modes: Stand alone, ArcMap enabled, and Real-time data collection.

Stand alone: This mode allows you to download and save waypoints and tracks to ArcGIS shapefiles. It does not create a projection reference file (.prj) although the data is projected as the shapefile is created. It will not automatically add the shapefile to the ArcMap document. When the shapefile is added to the ArcMap document you may get an ArcMap error box pop up. Simply cancel the box and disregard. If the proper projection was set (shown later in this presentation) then the shapefile will align with your other service center data sets. You can use ArcCatalog to create a projection reference file at your convenience. You can select shapefiles to upload to the Garmin Map 76 through the DNR Garmin software.

ArcMap enabled: This mode allows you to do everything the stand alone mode does ***plus*** it adds the created shapefile directly to your open ArcMap document. A projection file is not created in this mode either but you can use ArcCatalog to create one at your convenience. Another option available to you when you have ArcMap open is you can select individual points, lines, or area features from shapefiles and send ***only*** the selected data to the edit table – thus saving substantial amounts of time editing extraneous data from the data prior to upload to the Garmin (see slide – Edit Table).

Real-time data collection: Collects data in real-time when a Garmin GPS is connected to a laptop or tablet PC. Typical connection comes through a USB to Serial interface plug or through a PC card serial port. Contact the NCGC GeoTech Services team for more information on connecting your Garmin directly to a computer.

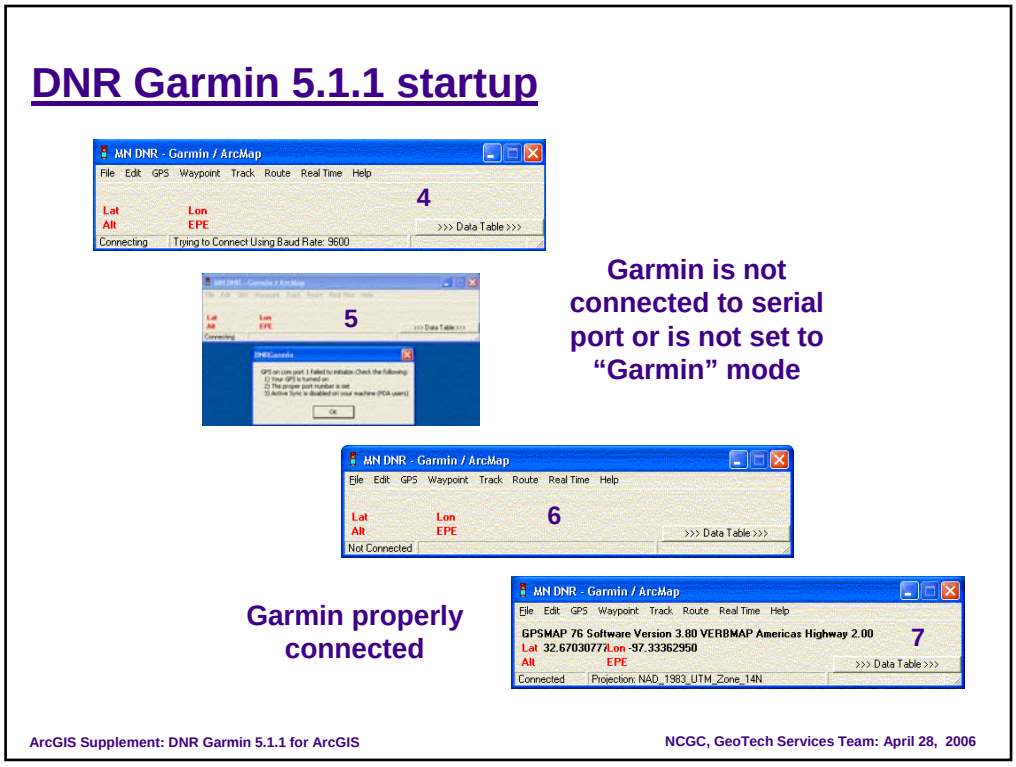


DNR Garmin 5.1.1 startup

1. You start DNR Garmin by double clicking on the desktop icon or by choosing the software from *Start > All Programs > DNR Garmin > DNR Garmin.*

2. The main interface window will open and the software about window will appear on top for just a second.

3. For a first time startup a window will next appear asking if you want to set a projection. It is best to click on Yes – refer to Slide 11 for instructions on how to set up your projection.

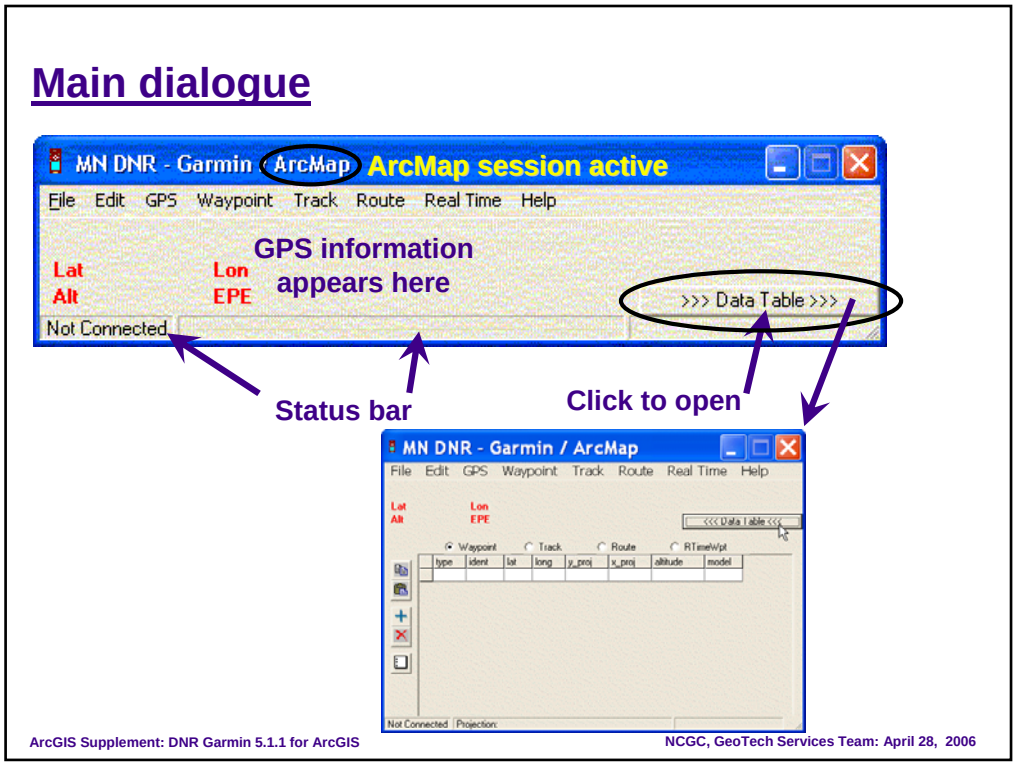


DNR Garmin 5.1.1 startup

4. The DNR Garmin software will attempt to connect to the Garmin receiver.

5. If the Garmin receiver is not connected to the serial port, powered up, and set to "Garmin" mode in the Setup/Interface menu then you will see an error window. Click on OK to close the window. To set the Garmin to "Garmin" mode simply turn on the receiver, push the MENU key twice, scroll down to Setup and push the ENTER key, scroll right to the INTERFACE tab, scroll down to the *Serial Data Format* field and push the ENTER key, select "Garmin" and push ENTER. Push the QUIT key until you are back to the Position page.

6. You can exit out of DNR Garmin and try again with the receiver properly connected and turned on or you can use the GPS menu (see Slide 15).



Main dialogue

The DNR Garmin 5.1.1 main menu has eight menus:

- File – Load from file, Save to file, set projection, get projection, exit.
- Edit – Edit tables and records, project/unproject coordinates, set image hotlink.
- GPS – Set port, set baud rate, Open/close port, Reset Garmin, Units, Garmin screen shot, Garmin info
- Waypoint – Download, upload, properties
- Track – Download, upload, properties
- Route – Download, upload, properties
- Real Time – Start/stop real-time tracking, View NMEA strings, Real-time properties
- Help – DNR Garmin Help File Index, About DNR Garmin extension

Status bar

Status of connection on the left side, projection on the right.

GPS Information Display

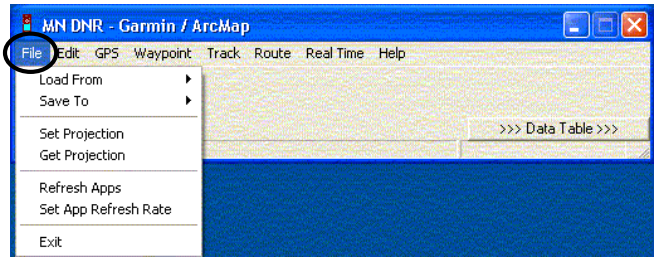
Displays Garmin model, software version, base map data version, Latitude, Longitude, Altitude, and Estimated Position Error when a Garmin receiver is connected, turned on, and set to 'Host' mode.

Data Table

Click on the data table to view and edit downloaded waypoints, tracks, routes, real-time.

Note: DNR Garmin 'senses' when ArcMap is open. If you start ArcMap then DNR Garmin the Main Dialogue will read ' …Garmin / ArcMap'. If you start DNR Garmin first then ArcMap the DNR Garmin Main Dialogue will read '…Garmin' then 'Garmin / ArcMap' as soon as the map document finishes opening.

File Menu



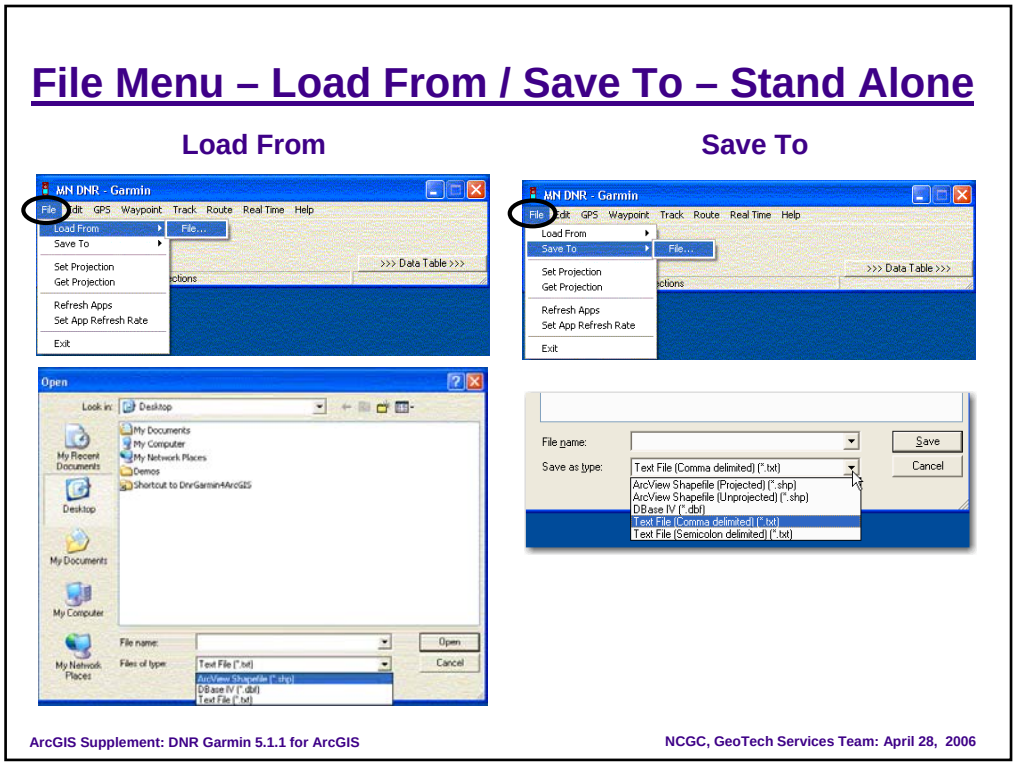
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

File menu

- Load from file – Loads data from saved text or ArcGIS shapefiles
- Save to file – Saves downloaded data to text or ArcGIS shapefiles
- Set projection –Sets the coordinates and datum you want your shapefiles projected to

  (Note: The all Garmins store coordinates using the WGS-84 datum)
- Get projection – Displays the projection that DNR Garmin is set to (but not the datum)
- Exit – Close the software and GPS port. All temporarily downloaded data is lost.



Load From and Save To – Stand alone mode

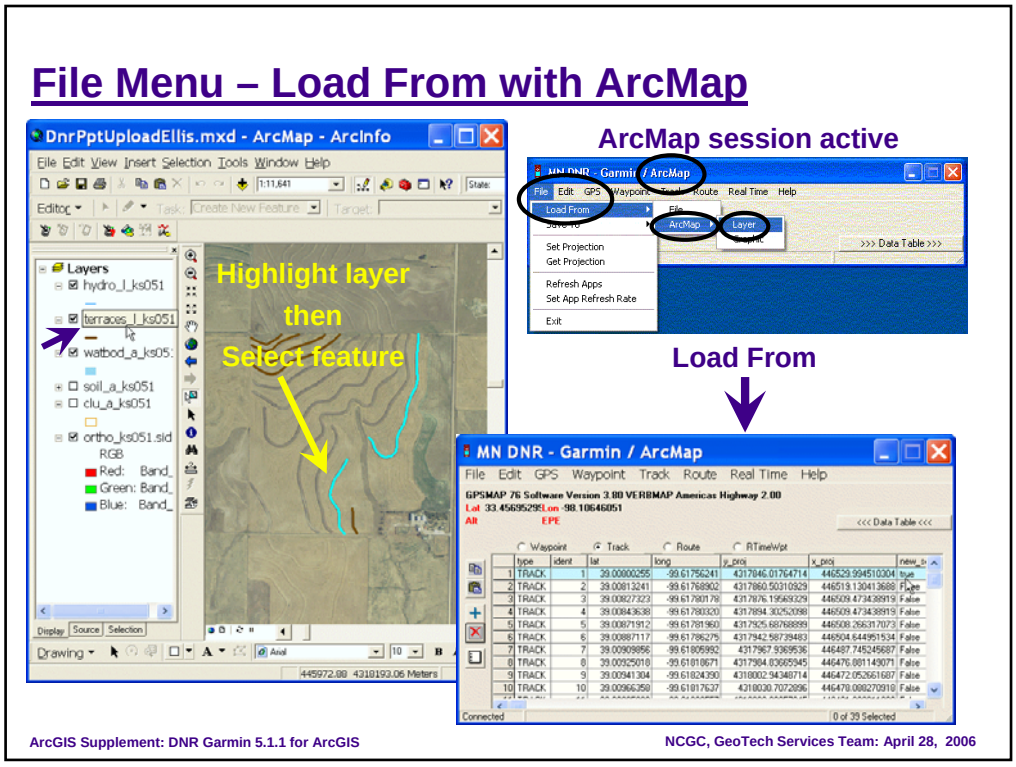
Your choices are somewhat limited in the DNR Garmin stand alone mode.

You can load from or save to ArcGIS shapefiles (*.shp), DBASE IV files (*.dbf), or text file (*.txt).

ArcGIS shapefiles – All of the features in the selected shapefile are loaded to the DNR Garmin edit table. You can select continuous rows of data from the edit table (see Slides 18 and 20). You can save to projected or unprojected shapefiles. Unprojected shapefiles will be saved in the Geographic Coordinate System (GCS). Projected files are saved in the projection you specified in File > Set Projection.

Text files - You can load from and save to text files but files that are loaded must match the DNR Garmin comma delimited format. You can create an empty file with just the DNR Garmin header record and import other comma delimited data. It is best to save a few text files and see how they are structured prior to trying editing.

Dbase files – You can load or save to Dbase IV formatted tables. The tables can then be added to an ArcMap session.



File Load From – ArcMap active

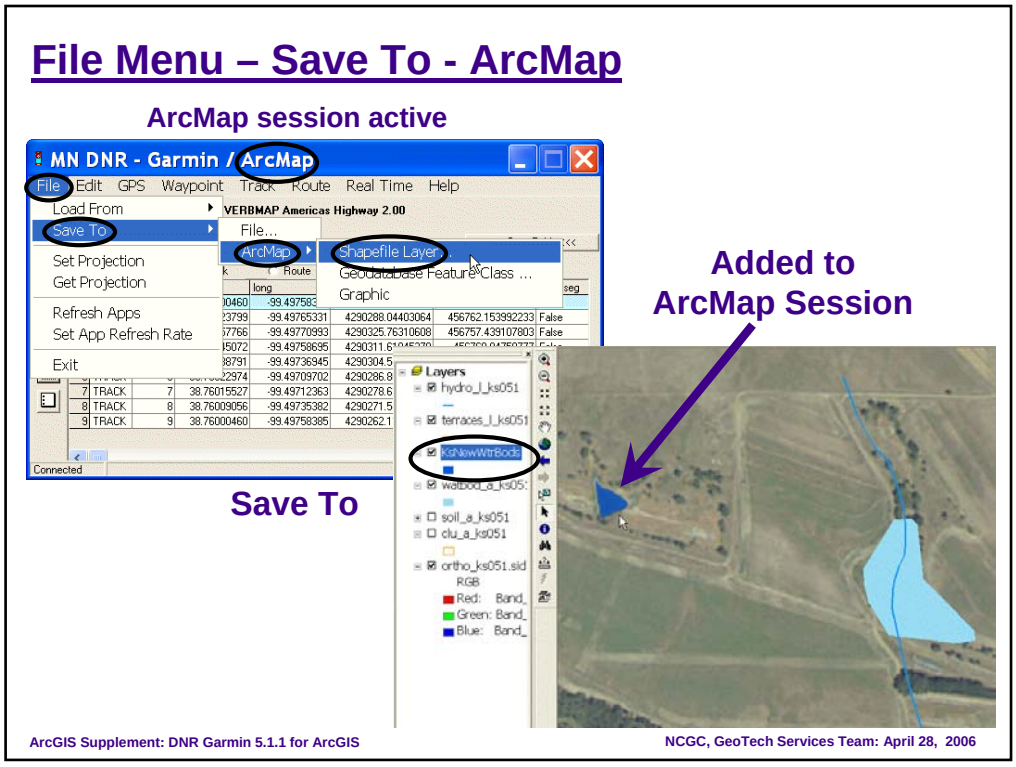
The DNR Garmin software 'senses' whether or not you have an ArcMap session open. If you have an open ArcMap session then the *File > Load From* menu changes slightly to include 'ArcMap' options.

When you have an ArcMap session open you can select a shapefile or personal geodatabase feature class feature and load it directly to the DNR Garmin Data Table. The feature can then be uploaded directly to a Garmin GPS receiver (Note: The Garmin receiver must be in 'Garmin host mode'). Please refer to Slides 42-? for a detailed discussion of the Load From menu. You may also select an ArcMap graphic, send it to the Data Table, and upload it to a Garmin receiver.

Load From Options:

Layer – Highlight a layer in the ArcMap Table of Contents (TOC). You can also select an individual feature within the layer. Layers can be shape files or personal geodatabase feature classes. If you have a DNR Garmin projection set the layer data will be re-projected as it is submitted to the data table.

Graphic – Displays the data as an ArcMap graphic. Other ArcGIS tools can save the graphic to a shapefile if needed.



File Save To – ArcMap active

The DNR Garmin software 'senses' whether or not you have an ArcMap session open. If you have an open ArcMap session then the *File > Save To* menu changes slightly to include 'ArcMap' options.

When you have an ArcMap session open you can save all or a selected record set (See Slides 13, 19, and 22) to a shape file, geodatabase feature class, or graphic. Shape files and feature classes can be added to the ArcMap session – they will be displayed in the Table of Contents (TOC). Graphics will display directly in the data or layout view. Slides 32 to 41 of the section "Using DNR Garmin 5.1.1" discusses saving to ArcMap shapefiles in detail.

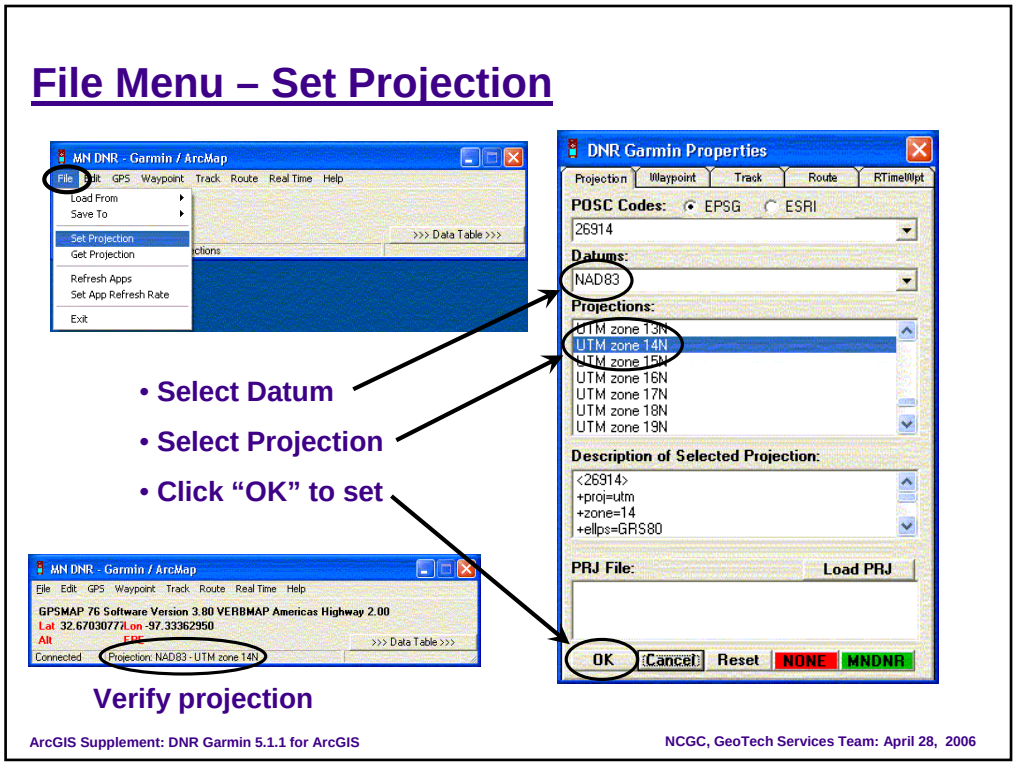
Save To Options:

Shapefile layer – The shapefile is saved in projected coordinates to the location you specify and is automatically added the ArcMap Table of Contents.

Geodatabase feature class – saves to a personal geodatabase feature class. An empty feature class must be created in ArcCatalog before performing the save. Saving to an SDE geodatabase is not tested at this time.

Graphic – Displays the data as an ArcMap graphic. Other ArcGIS tools can save the graphic to a shapefile if needed.

If you have a DNR Garmin projection set the data table records will be re-projected as they are compiled to the shape file, feature class, or graphic.



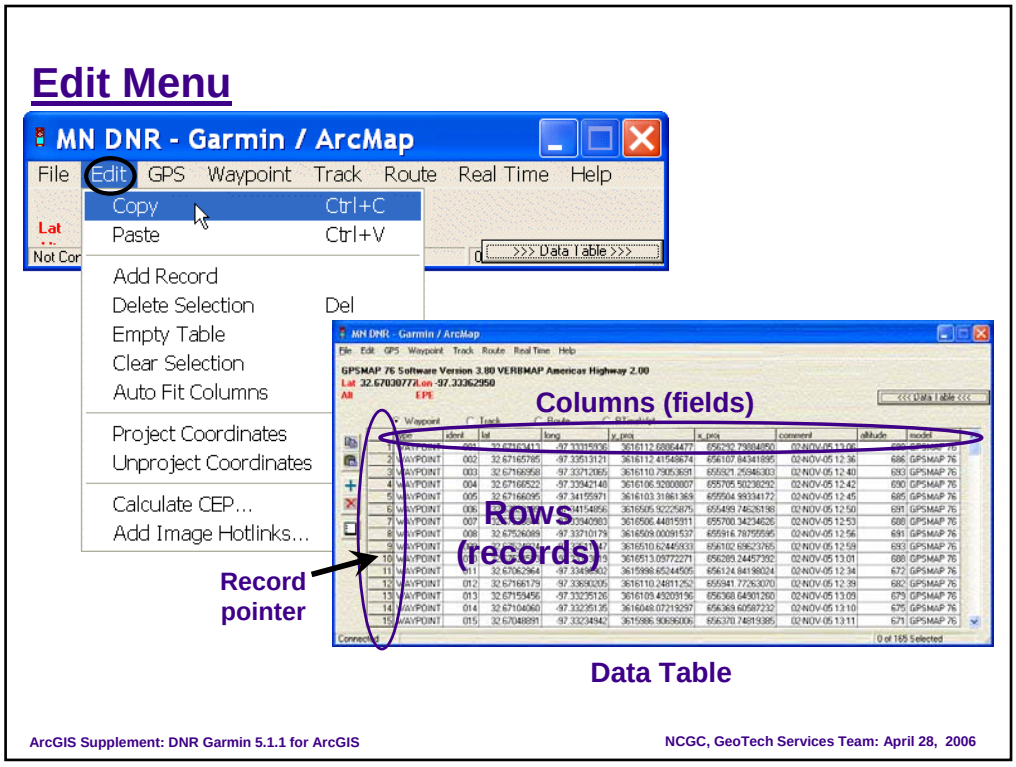
Set Projection

You have to choose a datum (reference) and projection. The POSC codes are listed in either EPSG or ESRI format. The default is EPSG and this presentation will teach you how to set up your projection based on the EPSG codes. Your selections are locked in and retained when you click 'OK'.

Datum – Scroll through the list of datums and click on NAD83.

Projection – Scroll through the list and click on 'UTM zone 14N'.

Click on 'OK' when finished.



Edit menu

The Edit menu is used to access the functions of the DNR Garmin data editing table. The table is blank until you download waypoints, tracks, or routes.

Copy – Copies records into temporary memory.

Paste – Pastes copied records into the edit table.

Add Record – Adds a blank record at the bottom of the table.

Delete Selection – Removes selected records from the table.

Empty Table – Removes all records from the table.

Clear Selection – Removes the record selection.

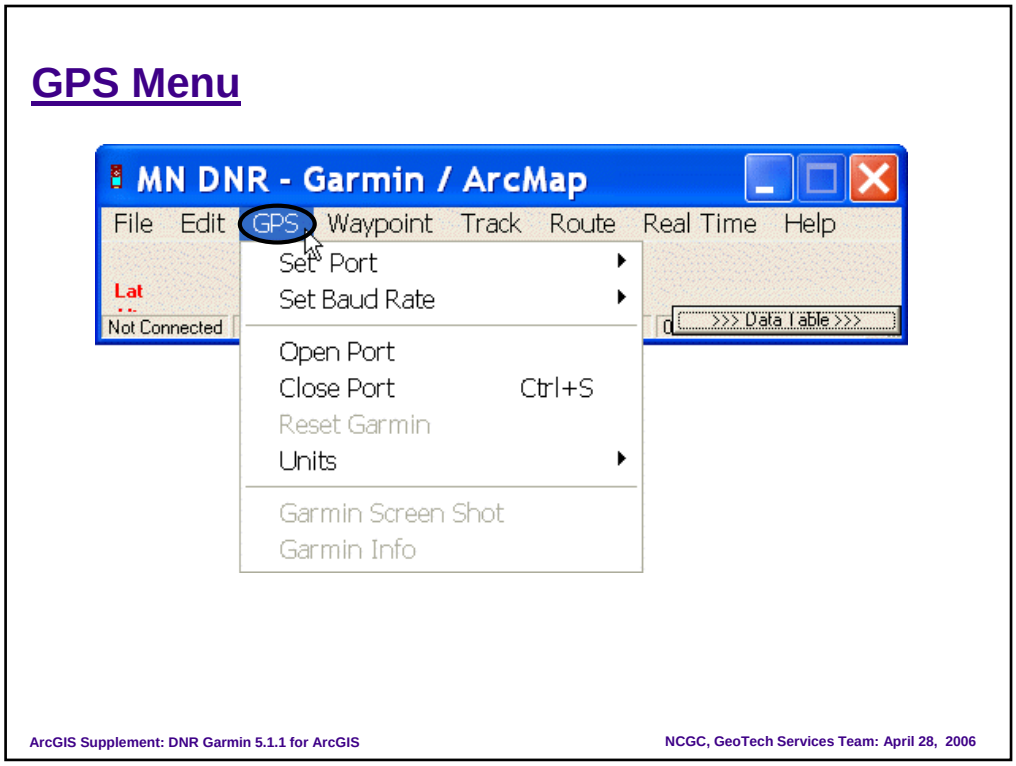
Project/Unproject Coordinates – Takes values from Lat/Long fields and projects to the user-specified projection. Takes values from Y_proj and X_proj fields and unprojects from the user-specified projection.

Calculate CEP – Allows user to calculate the Circular Error of Probability for the current Point Theme. This functionality can help determine the accuracy of your GPS Unit at a given location and a given time. Collect track points on a known position (benchmark) then save as a points shape file to ArcMap.

Add Image Hotlinks -

About the Data Table

The Data Table is organized into rows (records) and columns (fields). Each record represents one GPS position captured by a Garmin receiver. The first field is referred to as the pointer field. You select an entire row when you click in this left-most field. You can select multiple continuous rows by pressing the SHIFT key then left clicking with the mouse.



GPS menu

The GPS menu is used to set communication parameters between your computer and the Garmin (remember – the Garmin must be set to 'Garmin' mode in the Interface tab of the Setup Menu).

Set Port – Choose from a number of serial ports to select from – or choose 'USB' if you are using a CCE approved USB to Serial converter adapter.

Set Baud Rate – Choose a data transmission rate in bits per second. The default for Garmin is 9600 bps.

Open Port – Open the communications port for communications with the Garmin.

Close Port – Close the communications port.

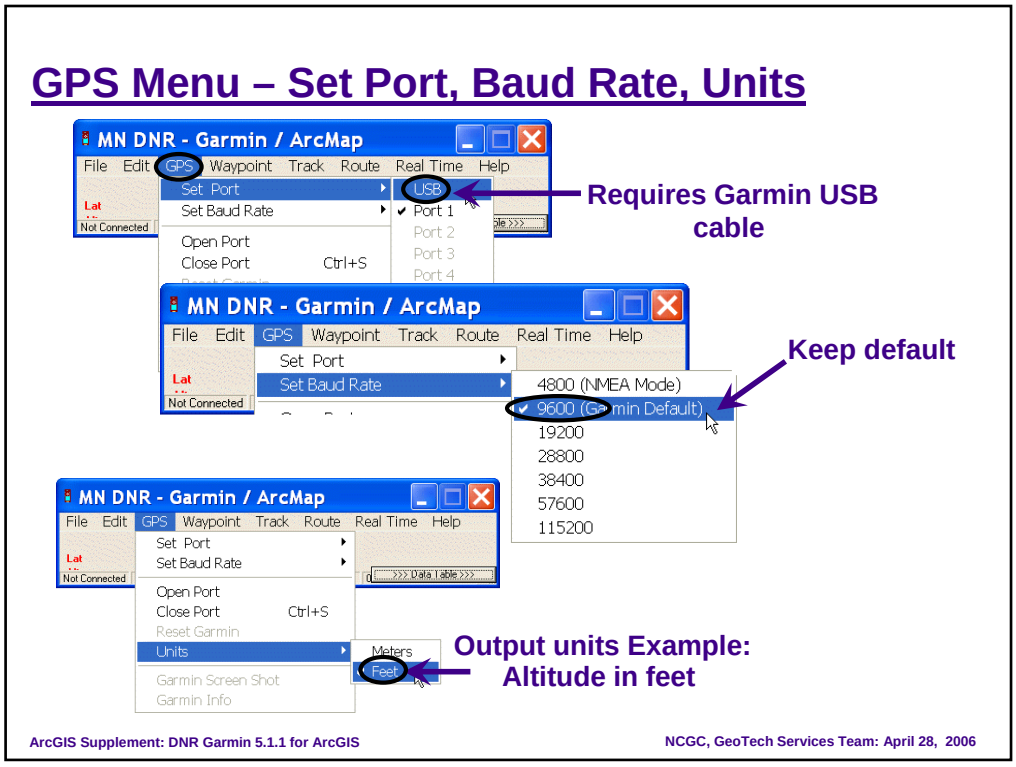
Reset Garmin – Reset the Garmin receiver (Note: Not recommended).

Units – Set the units of measure for the software. Choose from feet or meters.

Garmin Screen Shot – Capture a graphic of the Garmin screen. Highly recommended for communicating problems or creating training materials.

Garmin Info – Display Garmin receiver information.

Any transfer of data will cause the Garmin to display "Transfer Complete".



Set Port, Baud Rate, and Units on the GPS menu

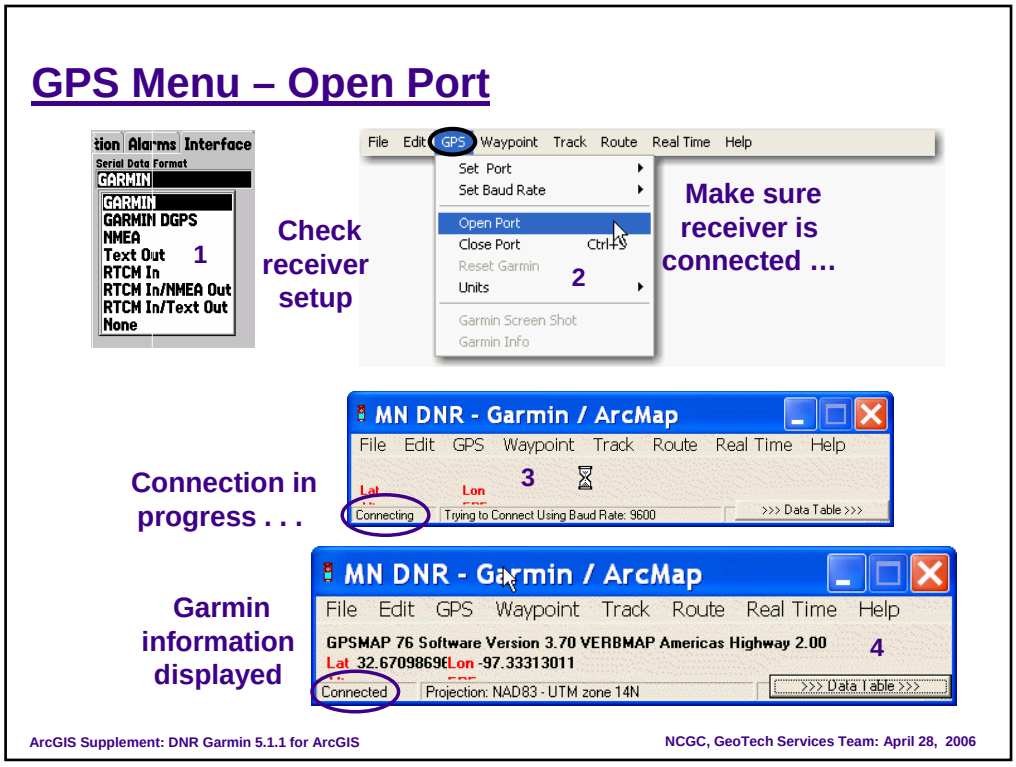
Set Port – Choose from a number of serial ports to select from – or choose 'USB' if you are using a CCE approved USB to Serial converter adapter. COM1 serial is the default choice.

Set Baud Rate – Choose a data transmission rate in bits per second. The default for Garmin is 9600 bps.

Units – Set the output units of measure for downloading data.

Choose from feet or meters.

These settings are retained in the software until you change them.



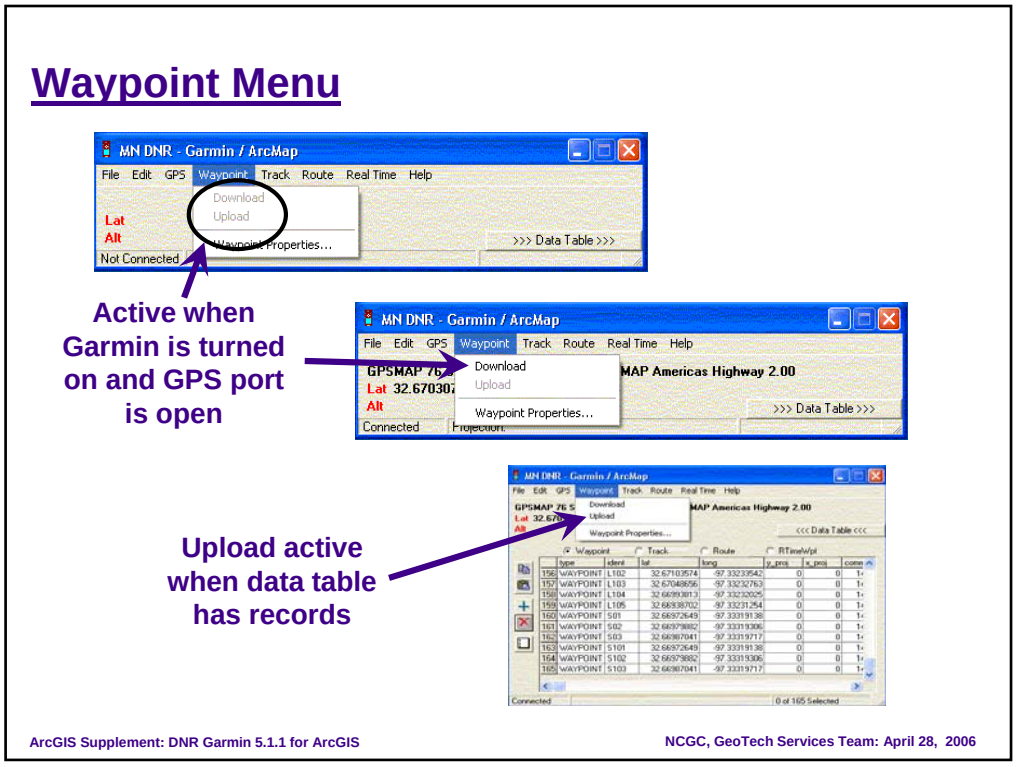
GPS Menu – Open Port

1. Be sure the Garmin is set up in Garmin interface mode. To do so simply turn on the receiver, push MENU key twice, down scroll to Setup and push the ENTER key, right scroll to the Interface tab, down scroll to Serial Data Interface format field and push ENTER. Select ‘Garmin’ as the mode and push the ENTER key again to lock in the setting.

2. Click on GPS menu, Open Port.

3. The port will open – the DNR Garmin window will display ‘Connecting’ in the lower left corner.

4. The window will show ‘Connected’ in the lower left corner when you have successfully connected to the Garmin receiver. The current coordinates and projection will also show.

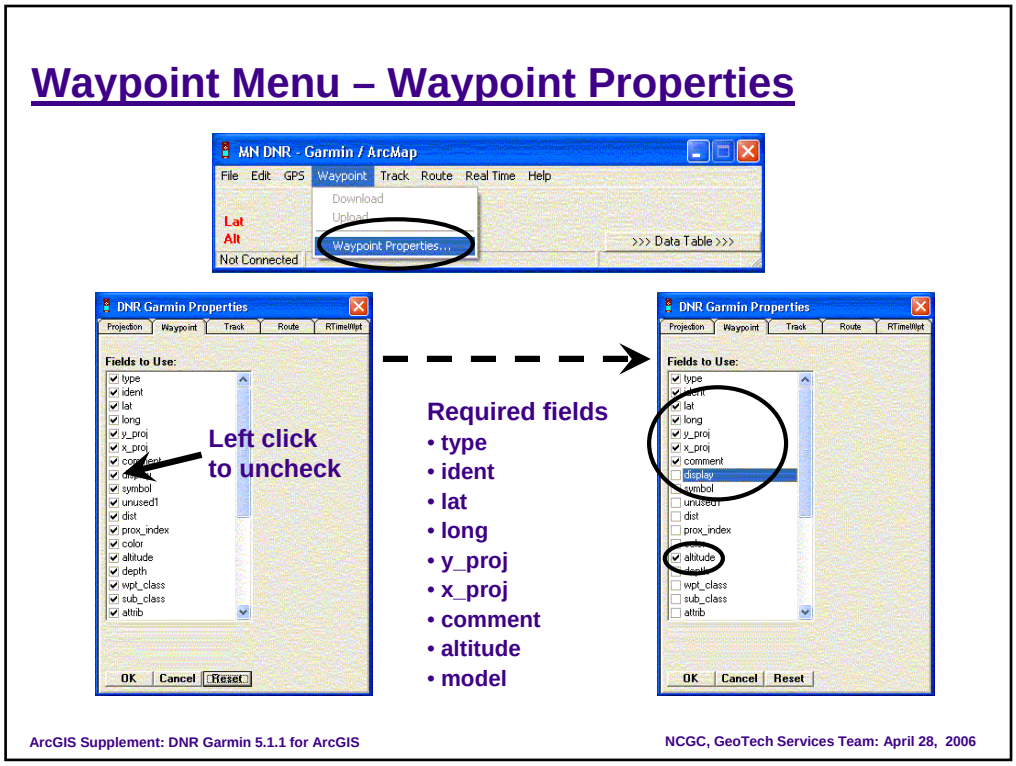


Waypoint menu

Download – When receiver is connected this menu selection will download waypoints from the Garmin waypoint memory to the edit table.

Upload – When receiver is connected this menu selection will send waypoints from the edit table to the Garmin waypoint memory.

Waypoint properties – Allow you to choose which fields (columns) you want populated in the edit table.



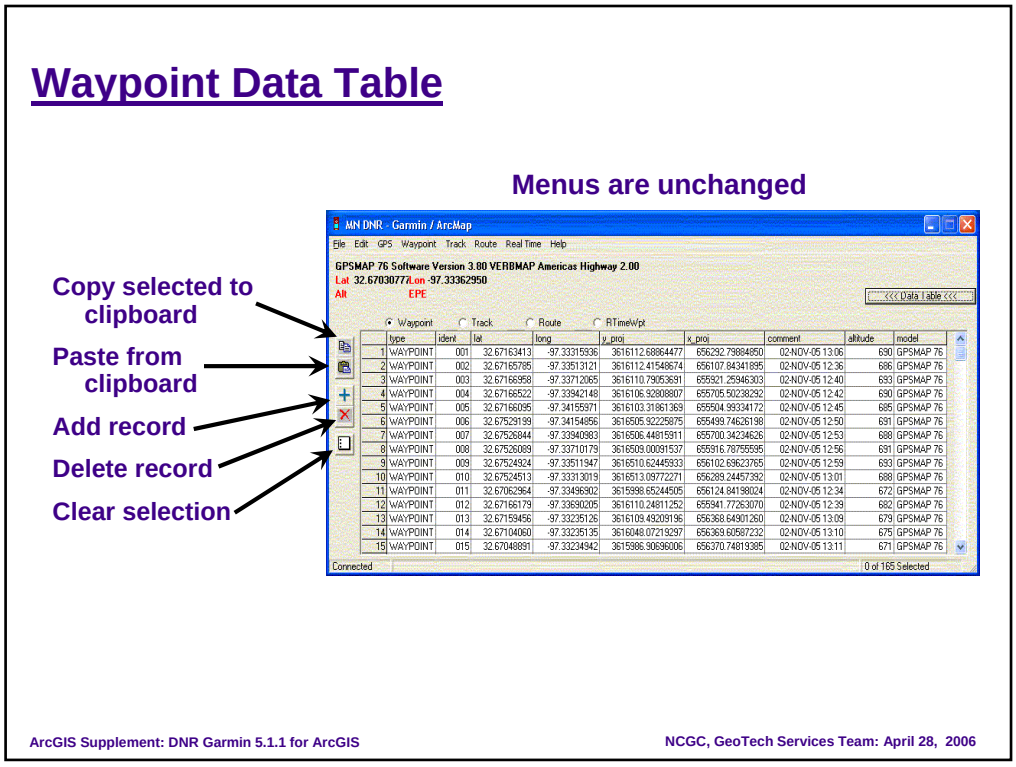
Waypoint Properties in the Waypoint menu

All of the fields that DNR Garmin will create when saving a shapefile, feature class, or text file are listed in the properties dialogue.

Simply uncheck the fields (columns) you do *not* want saved into your data. The default is all checked. When you start unchecking boxes the size of the edit table shrinks to fit the new column structure.

Required fields are: Type, ident (identity), lat (latitude), long (longitude), y_proj, x_proj, comment, altitude, and model. The y/x_proj columns store the projected coordinates based on the projection selection you made.

Note that the Waypoint properties dialogue is but one of several tabs in the DNR Garmin Properties dialogue. Other tabs include Projection, Tracks, Routes, and Real-time.



The Waypoint data table

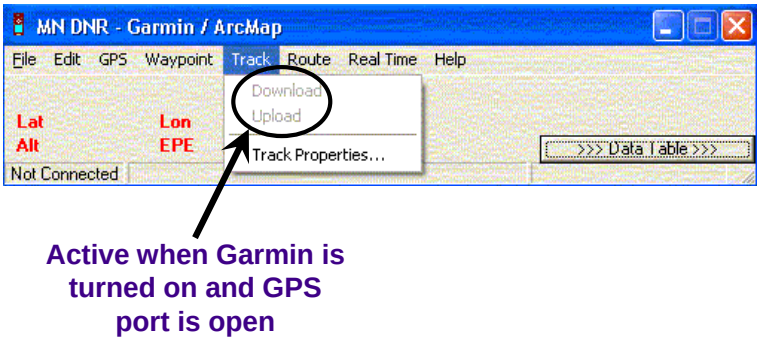
When you download waypoints from the Garmin receiver they are stored in a waypoint edit table. The table allows you to copy/paste records, add blank records that you can fill in, select records, delete records, and clear selection of records.

There are shortcut buttons just to the left of the record pointer column. These buttons function the same as the menu choices in the Edit Menu.

If you want to select records or groups of records simply left click in the pointer column for each record. Shift + click will allow you to select groups of *continuous* records. You can not use the Ctrl + click to select discontinous groups of records.

Once records are selected they can be deleted by clicking the delete selected record button. 

Track Menu



ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

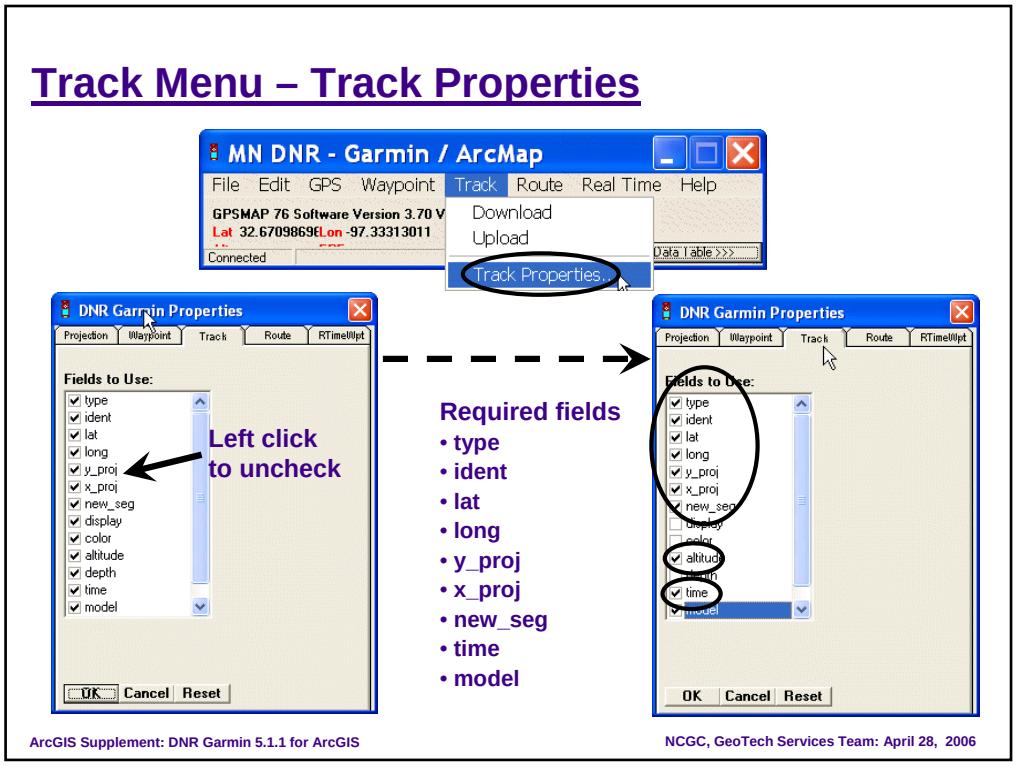
NCGC, GeoTech Services Team: April 28, 2006

Track menu

Download – When receiver is connected this menu selection will download track points from the Garmin track log memory to the edit table.

Upload – When receiver is connected this menu selection will send track points from the edit table to the Garmin track log memory.

Track Properties – Allow you to choose which fields (columns) you want populated in the edit table.



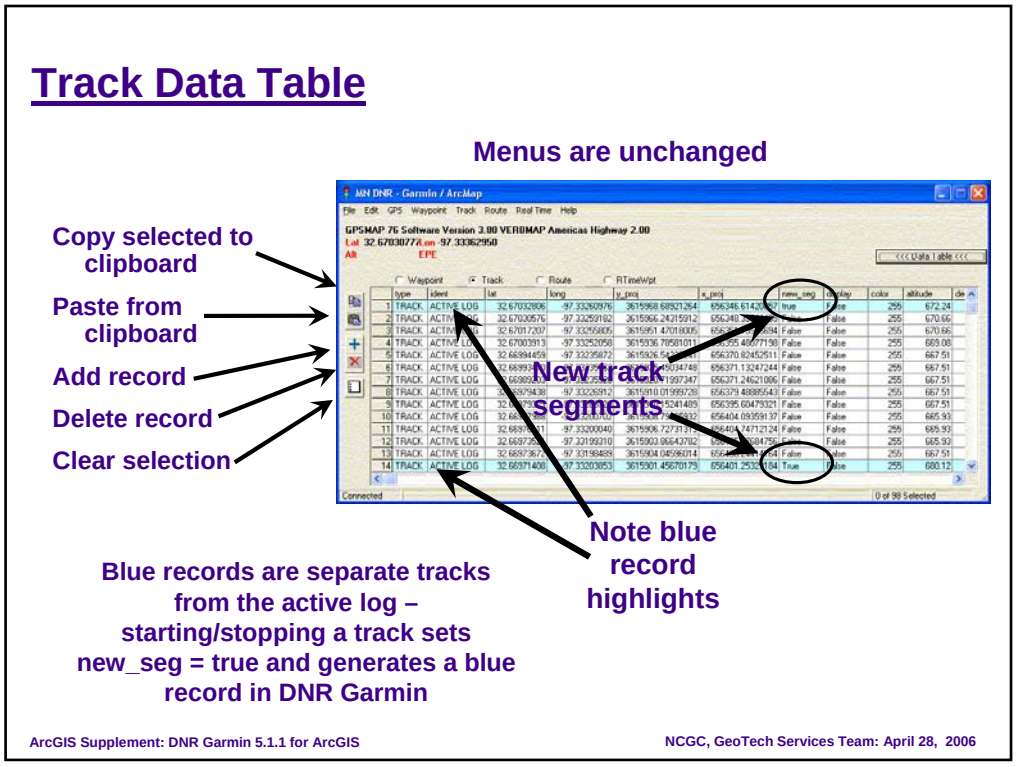
Track Properties in the Track menu

All of the fields that DNR Garmin will create when saving a shapefile, feature class, or text file are listed in the properties dialogue.

Simply uncheck the fields (columns) you do *not* want saved into your data. The default is all checked. When you start unchecking boxes the size of the edit table shrinks to fit the new column structure.

Required fields are: Type, ident (identity), lat (latitude), long (longitude), y_proj, x_proj, new_seg, altitude, and model. The y/x_proj columns store the projected coordinates based on the projection selection you made.

Note that the Waypoint properties dialogue is but one of several tabs in the DNR Garmin Properties dialogue. Other tabs include Projection, Tracks, Routes, and Real-time.



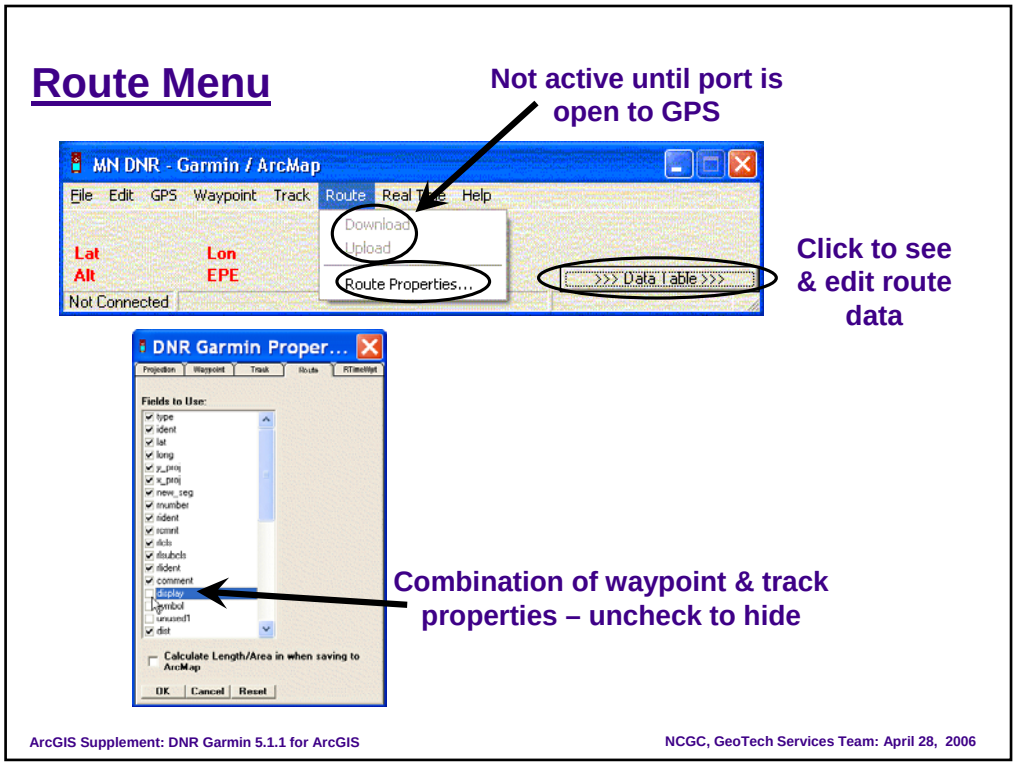
Track data table

When you download track points from the Garmin receiver they are stored in a track point edit table. The table allows you to copy/paste records, add blank records that you can fill in, select records, delete records, and clear selection of records.

There are shortcut buttons just to the left of the record pointer column. These buttons function the same as the menu choices in the Edit Menu.

If you want to select records or groups of records simply left click in the pointer column for each record. Shift + click will allow you to select groups of *continuous* records. You can not use the Ctrl + click to select discontinous groups of records.

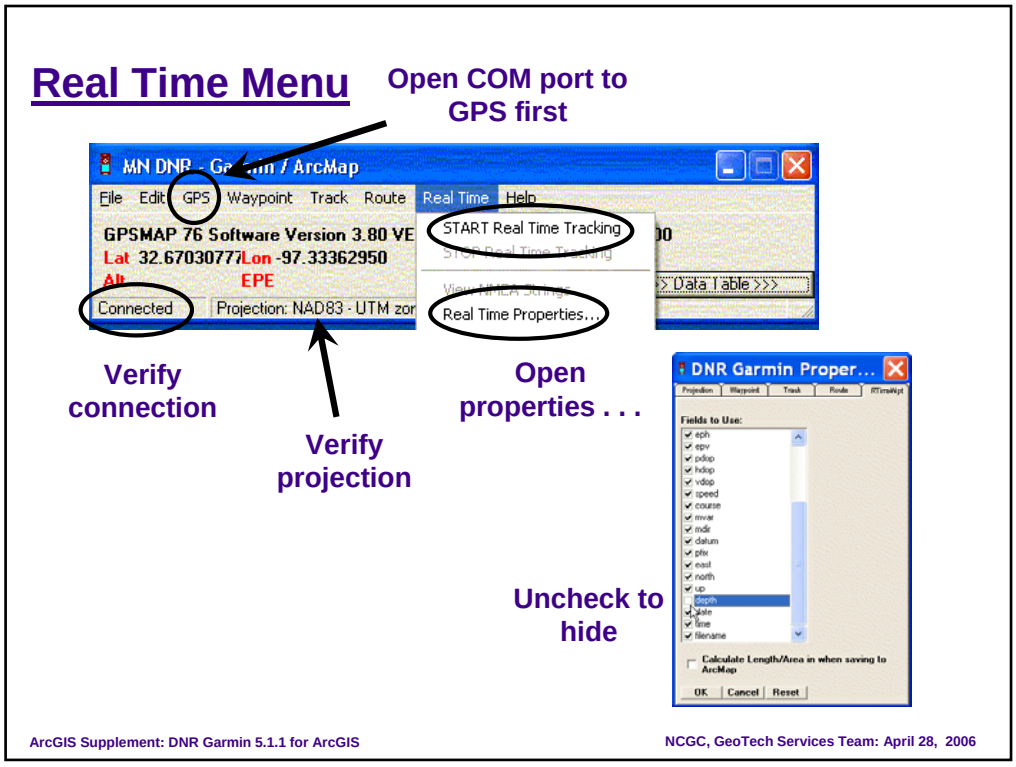
Once records are selected they can be deleted by clicking the delete selected record button. 



Route menu

Routes are groups of waypoints strung together for navigation purposes.

The Route menu functions in the same manner as the Waypoint and Track menus so we won't spend any time on discussing this menu.



Real Time menu

The Real Time menu allows you to collect and store GPS data from the Garmin receiver in real-time – you don't have to wait to download data.

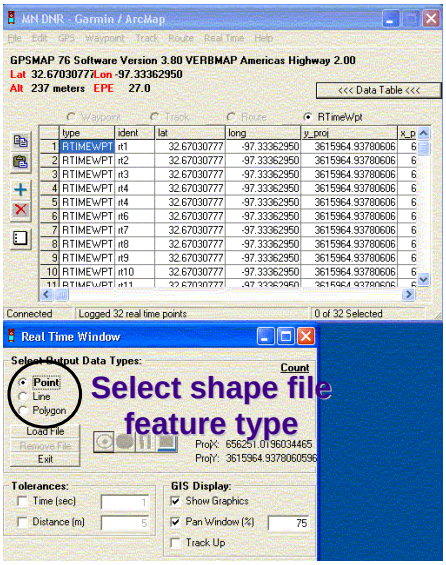
Start Real Time Tracking – Opens the Real Time Tracking window.

Stop Real Time Tracking – Stops real-time tracking and closes the window.

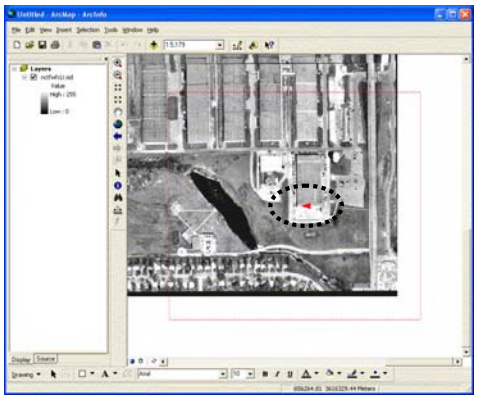
View NMEA strings – National Marine Electronic Association Version 2.X formatted text data can be viewed. The receiver must be turned on, the receiver must be computing 2D or 3D positioning, and the Garmin Interface must be set to NMEA.

Real Time Properties – Uncheck unnecessary fields to hide or to exclude from save to shape file attribute table

Real Time Menu - Activated



Real time data table – adding points to list



Real time position displayed over ArcMap ortho layer

ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

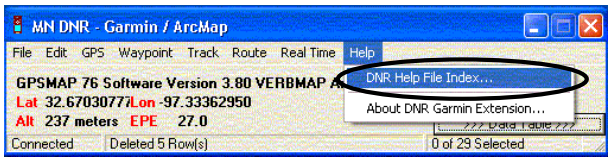
NCGC, GeoTech Services Team: April 28, 2006

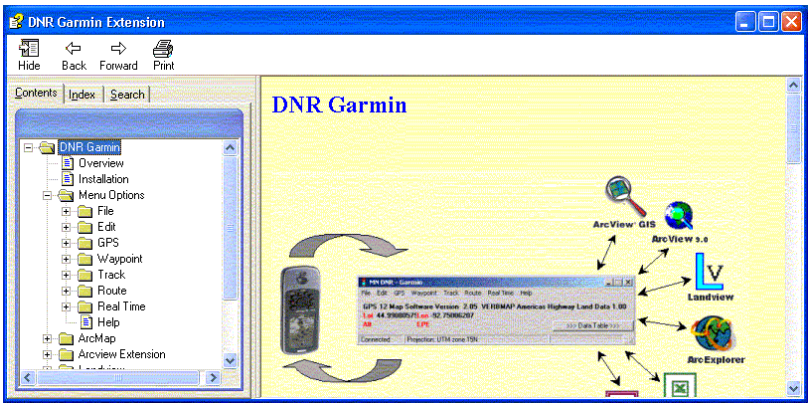
Real time menu activated

Real time tracking places track points into the edit table. It can also create ArcGIS shapefiles as well. The shapefiles can be point, line, or polygon features. When real time tracking is activated a Real Time Window appears. You can turn tracking off/on and collect different shapefile data types. Your position is displayed directly to the ArcMap document – you can see where you are in real time.

The real time tracking mode is utilized extensively by Texas NRCS for planning brush management treatments. The DNR Garmin is run on Tablet PC computers mounted on 4-wheelers or inside pickup trucks.

Help Menu – Help documentation





ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

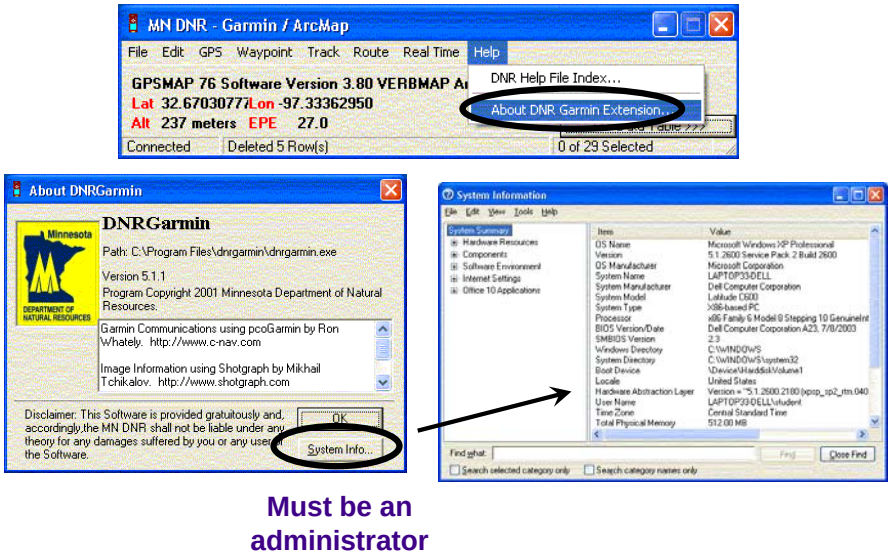
NCGC, GeoTech Services Team: April 28, 2006

Help menu and documentation

There is an extensive set of help documentation included with DNR Garmin software.

If you need further assistance with the software please use the support contacts provided on Slide 42.

Help Menu – Software version



ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Help menu – software version

When you click on “About…” you will see window that provides complete information about the DNR Garmin software.

You must be a system administrator to access the System Info through the DNR Garmin Help Menu.

Using DNR Garmin 5.1.1

- **Start an ArcMap session – either new or a customer map document**

- **Start DNR Garmin**
  - **Leave receiver off**
  - **If receiver is on make sure it is set to 'Simulating GPS'**

ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Using DNR Garmin 5.1.1 – a guide

- Start an ArcMap session

  Open either a new map document or a customer map document.

- Double click on the DNR Garmin icon on your desktop – I highly recommend you leave your receiver turned off.

Connect the Garmin to your PC

In the DNR Garmin software…

- **Set port, baud rate, & units prior to turning on receiver**
- **Set projection prior to turning on receiver**
- **Set Waypoint and Track properties prior to turning on your receiver**

Then …

- **Connect Garmin PC cable DB9 to your computer serial port**
- **Connect Power Data plug into the Power Data Port**

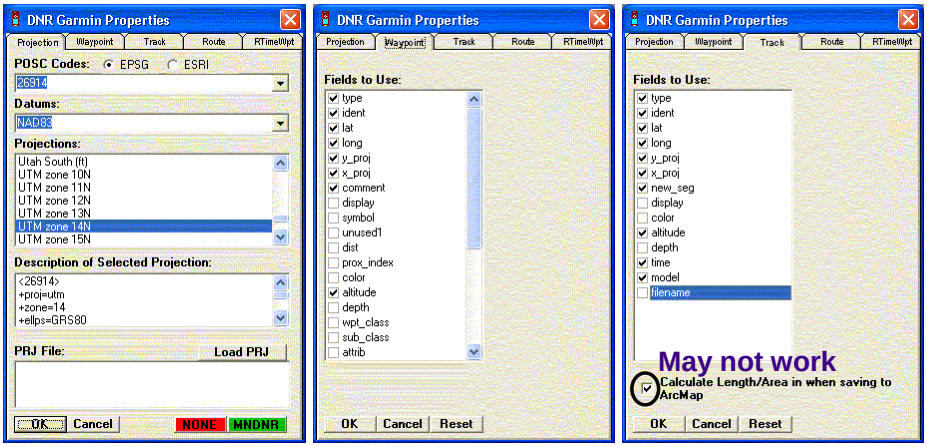
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Connect the Garmin to your PC

- In the DNR Garmin software use the GPS Menu to set the port, baud rate, and units.
- Set the projection in the File Menu > Set Projection.
- Set the Waypoint and Track properties in the DNR Garmin Properties window.
- Next connect your receiver to the DB9 serial port of your computer using the Garmin PC cable.
- Then connect the other end to the power data port of the Garmin receiver.

Set Projection / Waypoint / Track Properties



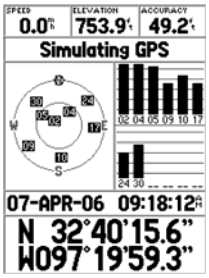
Projection Waypoint Tracks

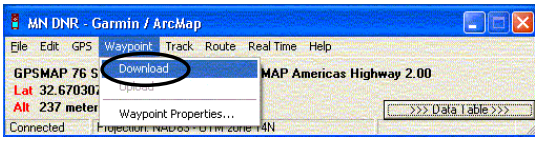
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS NCGC, GeoTech Services Team: April 28, 2006

Set Projection, Waypoint, and Track properties

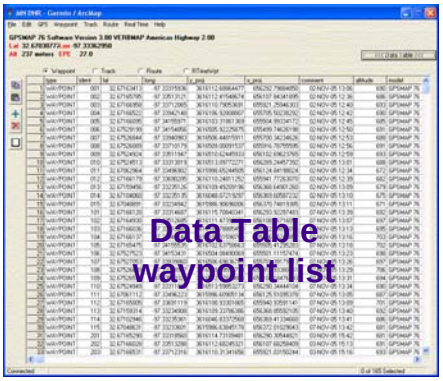
- Access the DNR Garmin Properties window through the File, Waypoint, Track, Route, or Real Time menus.
- Set the projection in the Projection tab by selecting NAD83 from the Datum pull down, then UTM zone 14N from the Projection dropdown.
- Next uncheck all unnecessary fields in the Waypoint tab,
- Then uncheck all unnecessary fields in the Track tab.

Download Waypoints





- Turn on Garmin
- Set to 'Simulator' mode
- Set serial interface to 'Garmin' mode
- DNR Garmin - Waypoint menu - Download



Data Table waypoint list

ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

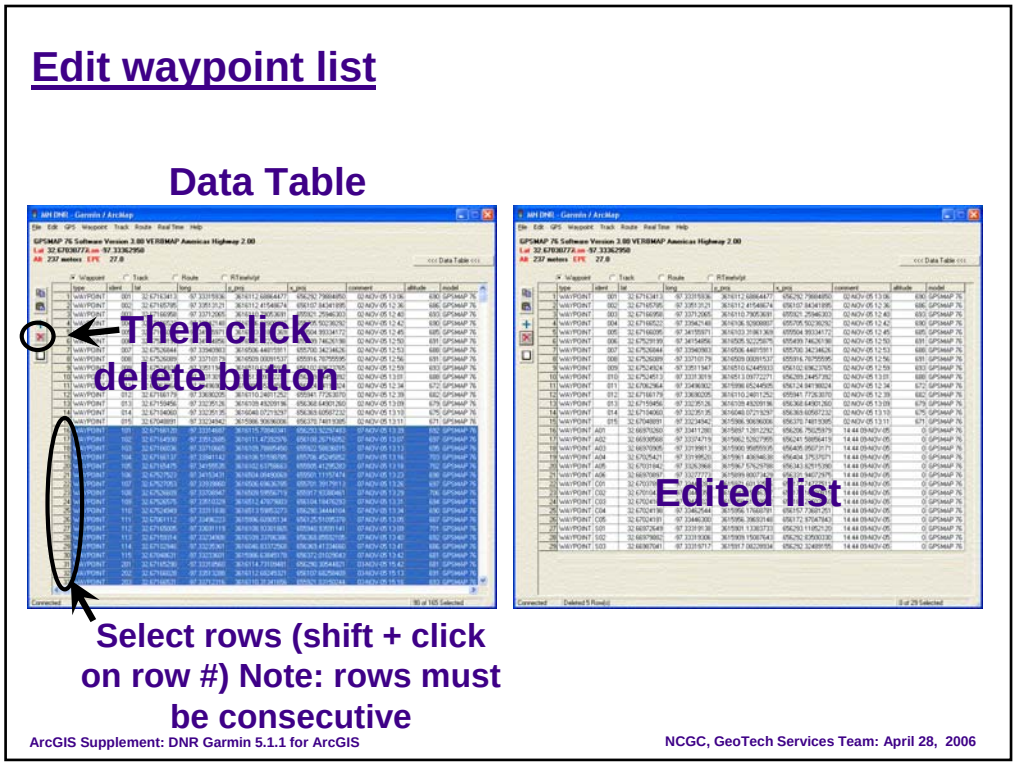
Download waypoints

▪ Turn on the Garmin receiver. Push the MENU key once, scroll up/down to "Start Simulator" then press ENTER key.

▪ Press the MENU key twice, scroll down to "Setup" and press ENTER.

▪ Scroll right to the Interface tab, scroll down to Serial Data Format field, press ENTER, and scroll up/down to "Garmin" then press ENTER. You are now ready to download waypoints.

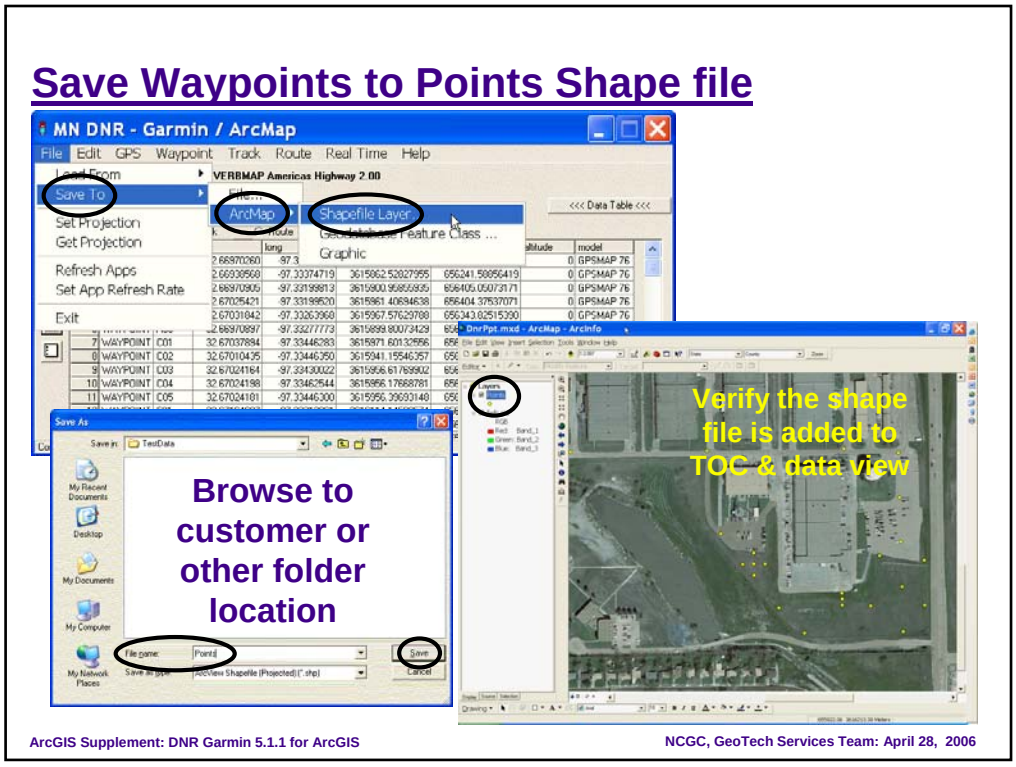
▪ Click on the DNR Garmin Waypoint menu and select Download. Wait for all of the stored waypoints to download and populate the edit table.



Edit the waypoint list

- Select the points you do not want to save by clicking in the record pointer field. Shift + click to select multiple continuous rows.
- Click on the Delete Selected Records button. 
- Review the edit table to be sure that all unneeded points are deleted.

NOTE: You may select a set of continuous points and save to a shapefile. DNR Garmin recognizes a selection set and will only save the selected records – but the selection *must* be continuous.

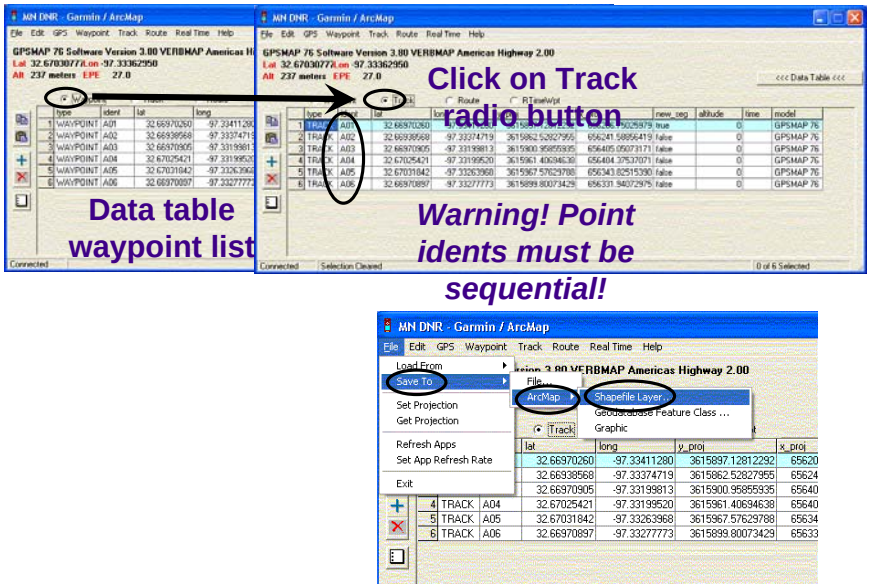


Save waypoints to points shape file

- Click on File > Save To > ArcMap > Shapefile layer.
- Browse to a folder, enter the name of the shapefile, and click the Save button.
- The shapefile will be saved to the specified location and the new shapefile will be added to your ArcMap document Table of Contents (TOC).

Warning: You can not perform a normal windows file deletion of a shapefile from this window – it will leave the extraneous file (*.dbf, *.shx…) behind.

Save Waypoints to line / area shape files

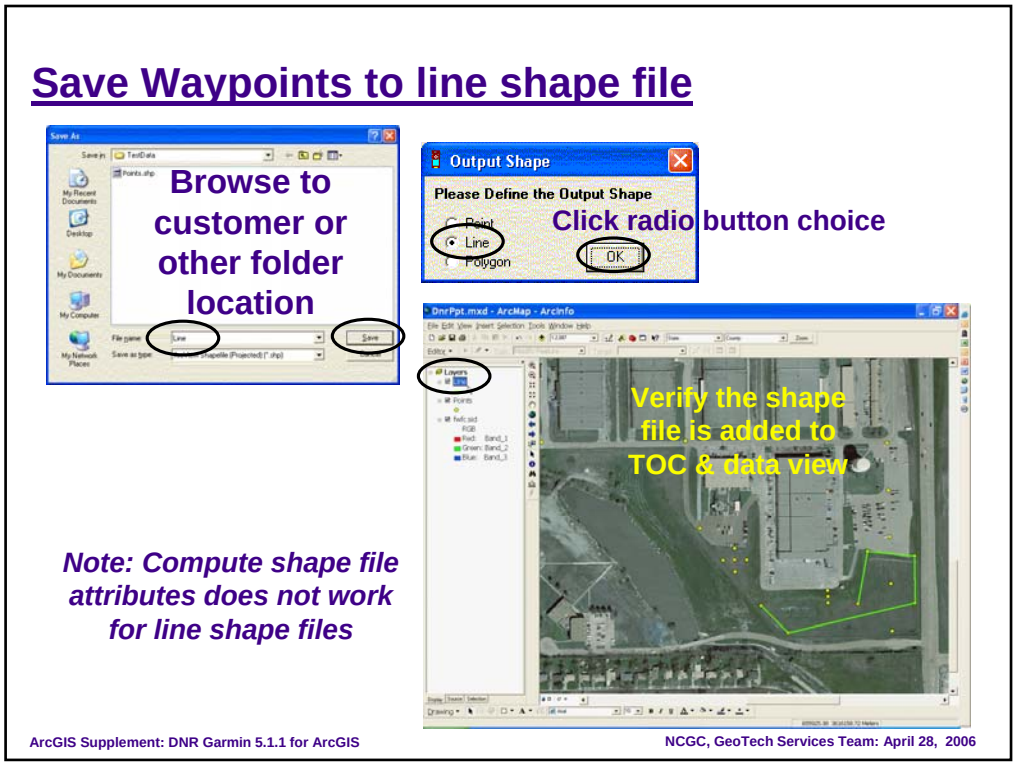


ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Save waypoints to line and area shape files

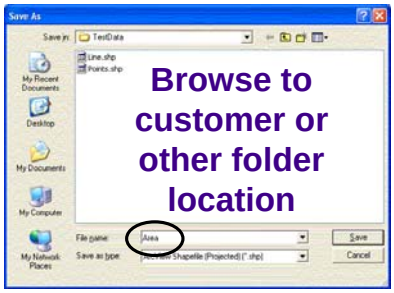
- A list of continuous and ordered points can be saved to a line or area shapefile. This is especially useful for describing regularly shaped features such as square fields. Waypoints around such as feature must be collected in descending order; for example, the NW corner of a field might be waypoint 1, the NE corner would be waypoint 2, the SE corner would be waypoint 3 and the SW corner would be waypoint 4. Waypoint data collection for building lines and areas should be planned before going to the field.
- Simple click the Track radio button. The waypoint list will be reformatted and the first point in the list will be highlighted in blue – this is the now the first point of a track point list.
- Then click on File > Save To > ArcMap > Shapefile layer.

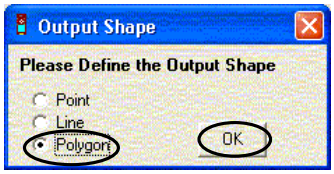


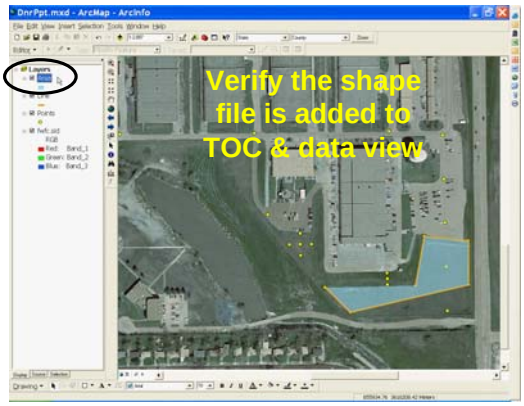
Save waypoints to a line shape file

- Browse to your location and enter the name of your shapefile.
- The Output Shape window appears – click on the Line radio button then OK.
- The line shapefile will be saved and it will appear in the map document TOC.
- Re-symbolize the line using the available ArcMap tools.

Save Waypoints to area shapefile







Shape file added to ArcMap document TOC

- **Change symbology**
- **Set transparency**

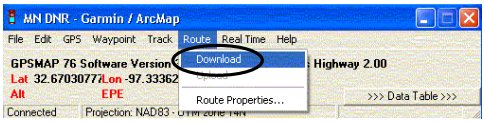
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

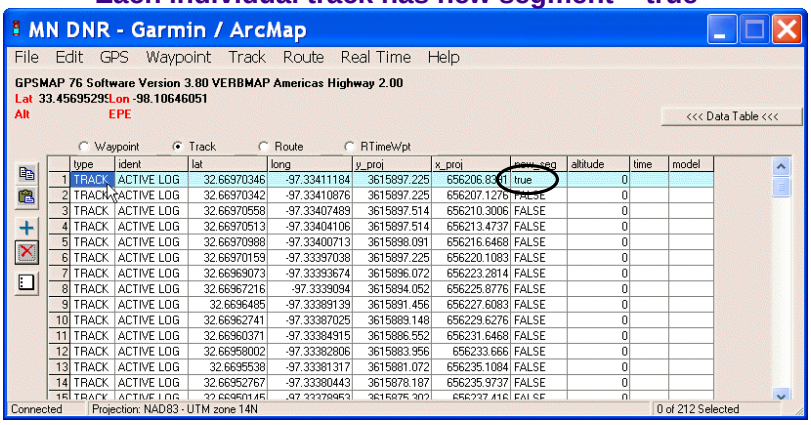
Save waypoints to area shapefile

- Browse to your location and enter the name of your shapefile.
- The Output Shape window appears – click on the Polygon radio button then OK.
- The polygon shapefile will be saved and it will appear in the map document TOC.
- Re-symbolize the polygon using the available ArcMap tools.

Download Tracks



Each individual track has new segment = true

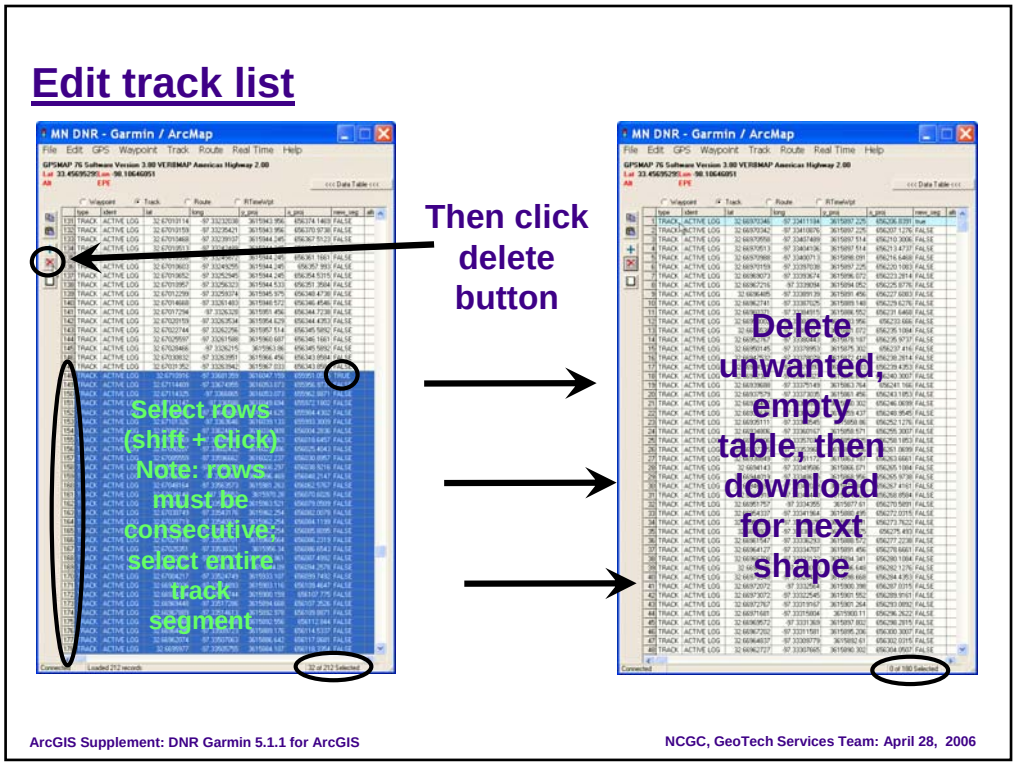


ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS — NCGC, GeoTech Services Team: April 28, 2006

Downloading track logs

If you have not done so already…

- Turn on the Garmin receiver. Push the MENU key once, scroll up/down to “Start Simulator” then press ENTER key.
- Press the MENU key twice, scroll down to “Setup” and press ENTER.
- Scroll right to the Interface tab, scroll down to Serial Data Format field, press ENTER, and scroll up/down to “Garmin” then press ENTER. You are now ready to download waypoints.
- Click on the DNR Garmin Track menu and select Download. Wait for all of the stored track points to download and populate the edit table.

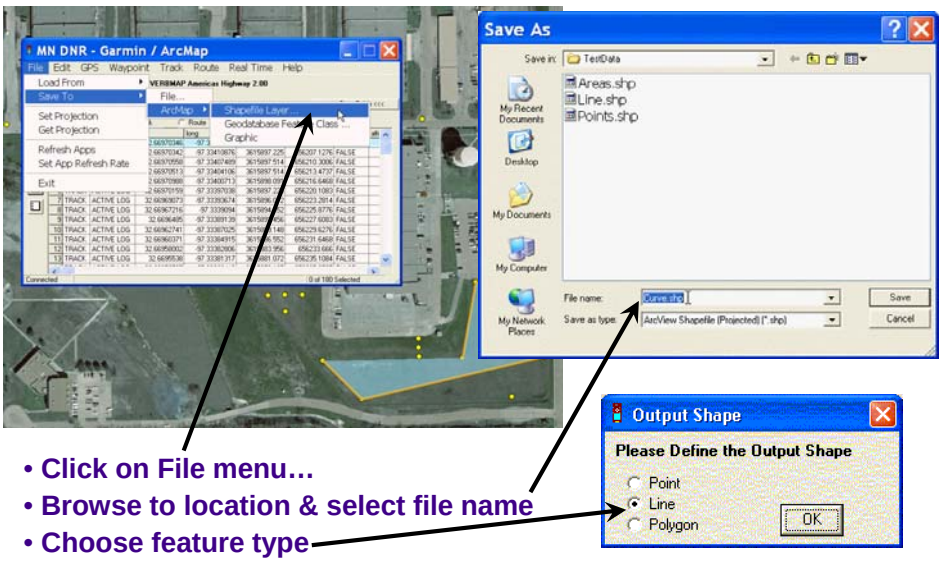


Editing the track list

- Select the tracks you do not want to save by clicking in the record pointer field. Use Shift + click to select all the track points in a track (remember, tracks are separated by a blue highlighted bar and have “True” in the new_seg field).
- Click on the Delete Selected Records button. 
- Review the edit table to be sure that all unneeded tracks and trackpoints are deleted.

NOTE: You may also select an individual track and it’s associated points and save to a shapefile. DNR Garmin recognizes a selection set and will only save the selected records – but all the track points must be selected and the selection *must* be continuous.

Save Tracks to Line Shapefiles



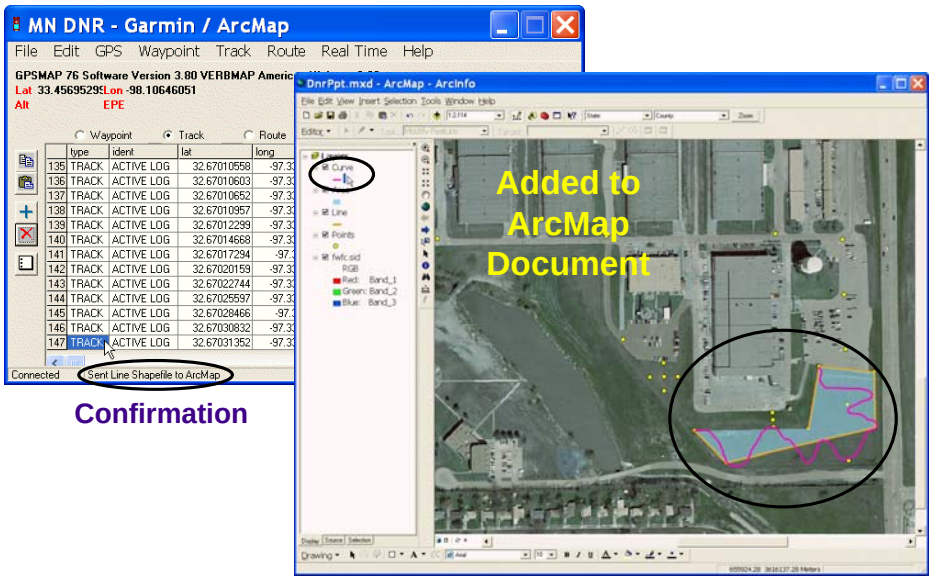
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Saving tracks to line shapefiles

- Click on File > Save To > ArcMap > Shapefile layer.
- Browse to your location and enter the name of your shapefile.
- The Output Shape window appears – click on the Line radio button then OK.
- The line shapefile will be saved and it will appear in the map document TOC.
- Re-symbolize the line using the available ArcMap tools.

Save Tracks to Line Shapefiles



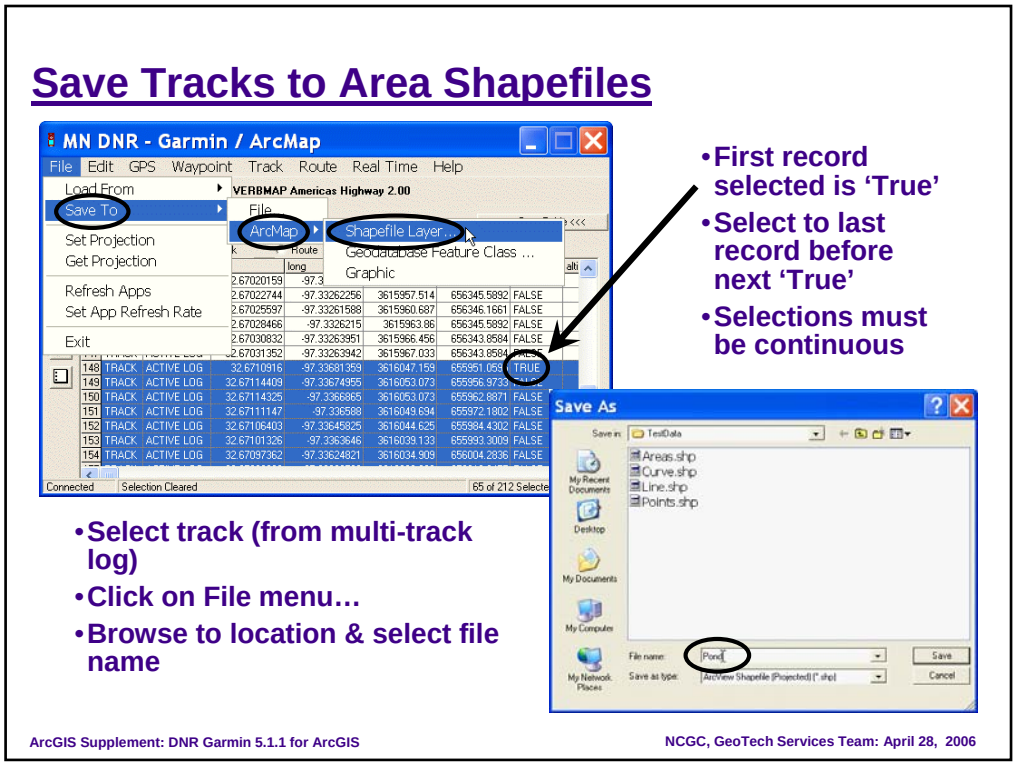
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Saving tracks to line shapefiles – continued

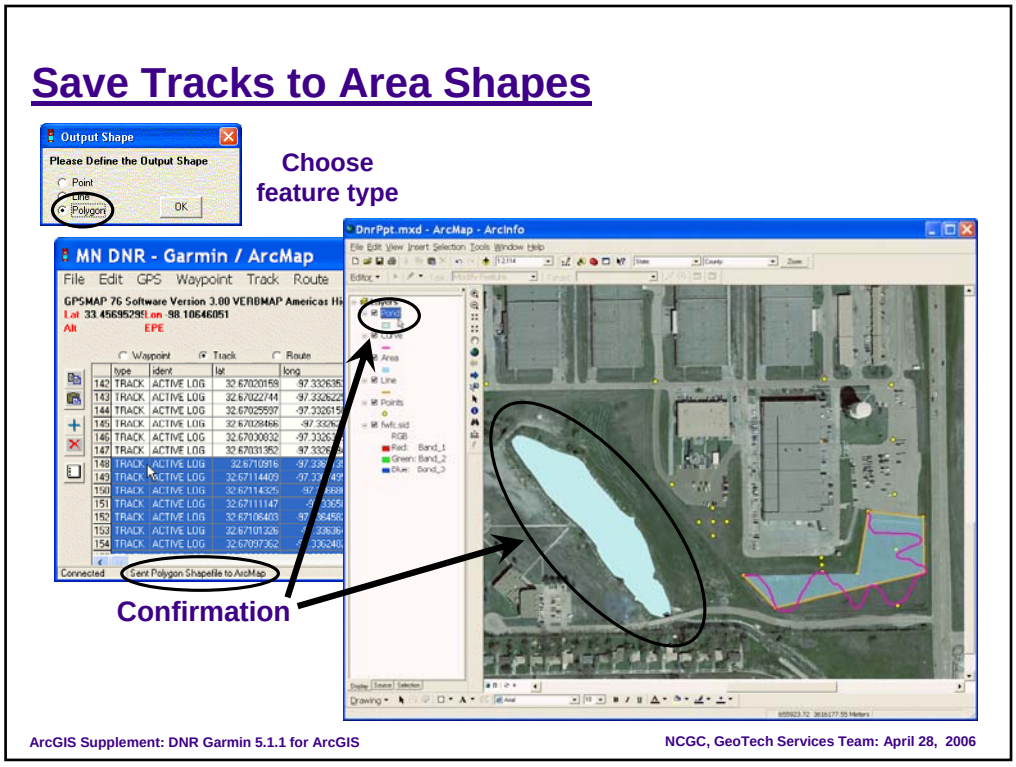
- Click on File > Save To > ArcMap > Shapefile layer.
- Browse to your location and enter the name of your shapefile.
- The Output Shape window appears – click on the Line radio button then OK.
- The line shapefile will be saved and it will appear in the map document TOC.
- Re-symbolize the line using the available ArcMap tools.

Note that the DNR Garmin software confirms a successful save. You can see this in the lower left corner of the edit table.



Saving tracks to area shapefiles

- You can select an individual track from a downloaded multi-track ACTIVE LOG:
  - The first record you select must have a value of 'True' in the new_seg field
  - The last record selected must come before the next 'True'
  - Selections must be continuous – you may select portions of a track – but you can't skip by using the Control key
  - Keep good field notes – it will save you considerable time sorting out different track features
- Click on File > Save To > ArcMap > Shapefile layer.
- Browse to your location and enter the name of your shapefile.



Saving tracks to area shapefiles – continued

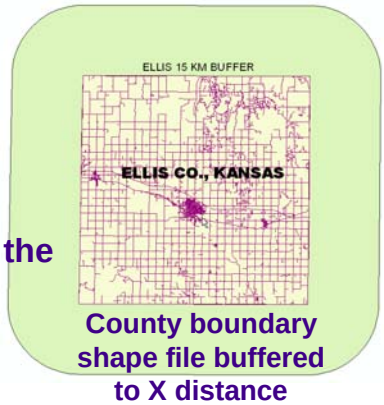
- The Output Shape window appears – click on the Polygon radio button then OK.
- The polygon shapefile will be saved and it will appear in the map document TOC.
- Re-symbolize the polygon using the available ArcMap tools (Hint: You can set the display transparency so you can see the ortho image beneath the area feature).

Note that the DNR Garmin software confirms a successful save. You can see this in the lower left corner of the edit table.

Saving Garmin data to a GDB feature class

ArcGIS Preparation

- Create personal geodatabase (ArcCatalog)
  - SDE GDB not tested yet…
- Create a shape file feature with large x,y domain (ArcToolbox)
- Export the shape file feature to the GDB (ArcCatalog)



County boundary shape file buffered to X distance

ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Saving Garmin data to a geodatabase feature class

Before you can save data you've downloaded from the Garmin to a geodatabase feature class you need to do a little preparatory work.

First you'll need to either have or create a personal geodatabase. The personal geodatabase will reside on your local drive. Do not create this on your desktop (C:\Documents and Settings\Desktop) – ArcGIS will not know how to read the spaces in the path names. Use ArcCatalog to browse to a location such as C:\Workspace. Then right click, select New, then scroll to 'Personal Geodatabase' and click.

You will be prompted through a series of dialogue screens. Provide a name for your personal geodatabase – otherwise accept the defaults.

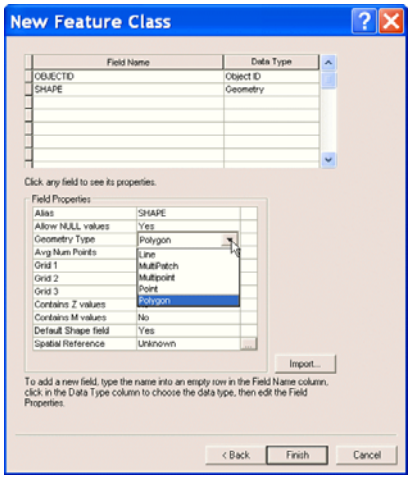
Now use ArcToolbox to create a shape file with a large X,Y domain (extent). You can use the county boundary shape file – but just to be sure you might want to add a buffer to it. Use the 'Analysis > Proximity > Buffer' tool in Toolbox. Select the county boundary file and follow the prompts.

Next export the buffered boundary (or the unbuffered one) to your newly created personal geodatabase. In ArcCatalog select and right click on your file, pull down to 'Export > To Geodatabase (Single)…'

Once export is finished use ArcCatalog find the exported feature class. Double click on the geodatabase feature class to open it's properties. Click on the Fields tab, then the 'Shape' field, then the Spatial Reference button (3 dots) on the right side of the Spatial Reference field.. The 'Coordinate System' tab will verify that the shape file spatial reference was exported to the geodatabase feature class. Click on the X/Y Domain tab to see the spatial extent and the precision for the feature class.

Saving Garmin data to a GDB feature class

- **Create feature class**
- **Set feature class type**



ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Saving Garmin data to a geodatabase feature class

Create a new feature class in the personal geodatabase by right clicking in an open spot, pulling down the context menu to ‘New’ then right to ‘Feature Class’. Name the feature class file name using standard CCE file naming convention – insert a simpler and more complete name into the Alias field.

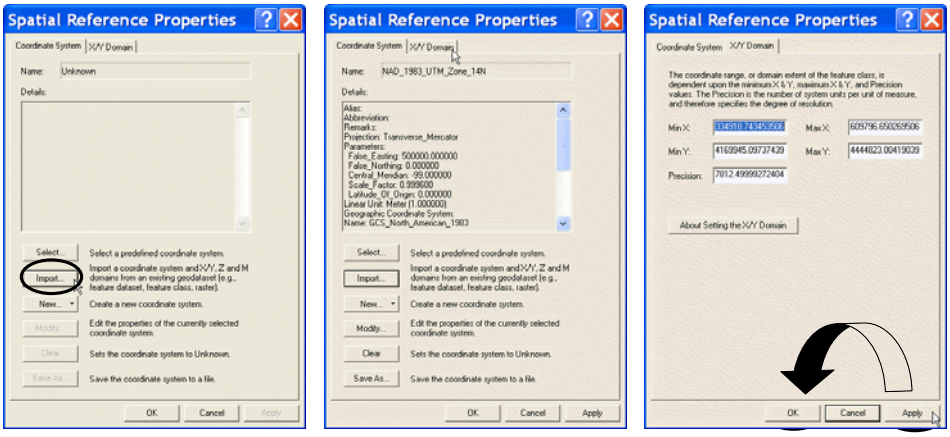
Next set the feature class type – in this case we will create a Polygon feature class.

Now we’re ready to set the spatial reference – the coordinate type, projection, and extent of the new feature class.

Click on the Spatial Reference Properties button (the three dots) on the right side of the Spatial Reference field.

Saving Garmin data to a GDB feature class

- **Import spatial reference from large x,y domain feature class**
  - **Example: Buffered county boundary**



Saving Garmin data to a geodatabase feature class

Click the ‘Import’ button. You will then be prompted to browse for the shape file or feature class reference to import (NOTE: To import an X,Y domain you MUST import from a geodatabase feature class). In this case we will browse to our newly created geodatabase and choose the buffered county boundary feature class.

The spatial reference data will now appear in the Details field of the General tab. Click on the X/Y Domain tab to verify that the feature class domain has been set the same as the buffered county boundary.

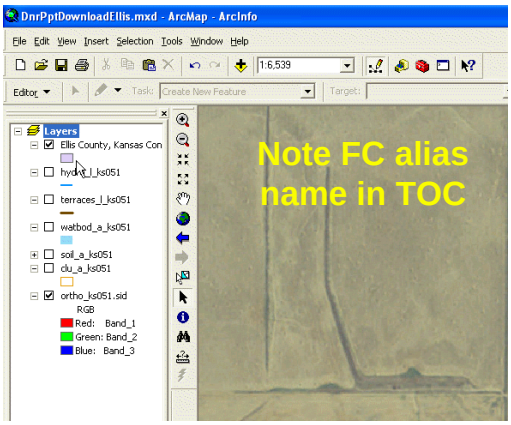
Click the Apply button, the OK button, then the Finish button to complete creating the new feature class.

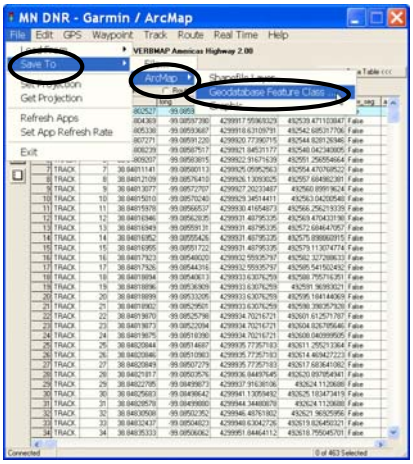
It is easier to import geodatabase feature class spatial reference and domain information but with some practice you can manually set them. View the topic “Specifying geodatabase settings” in the ArcGIS Desktop Help.

Saving Garmin data to a GDB feature class

- **Add empty feature class to ArcMap**

File > Save to > ArcMap > Geodatabase Feature Class





ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

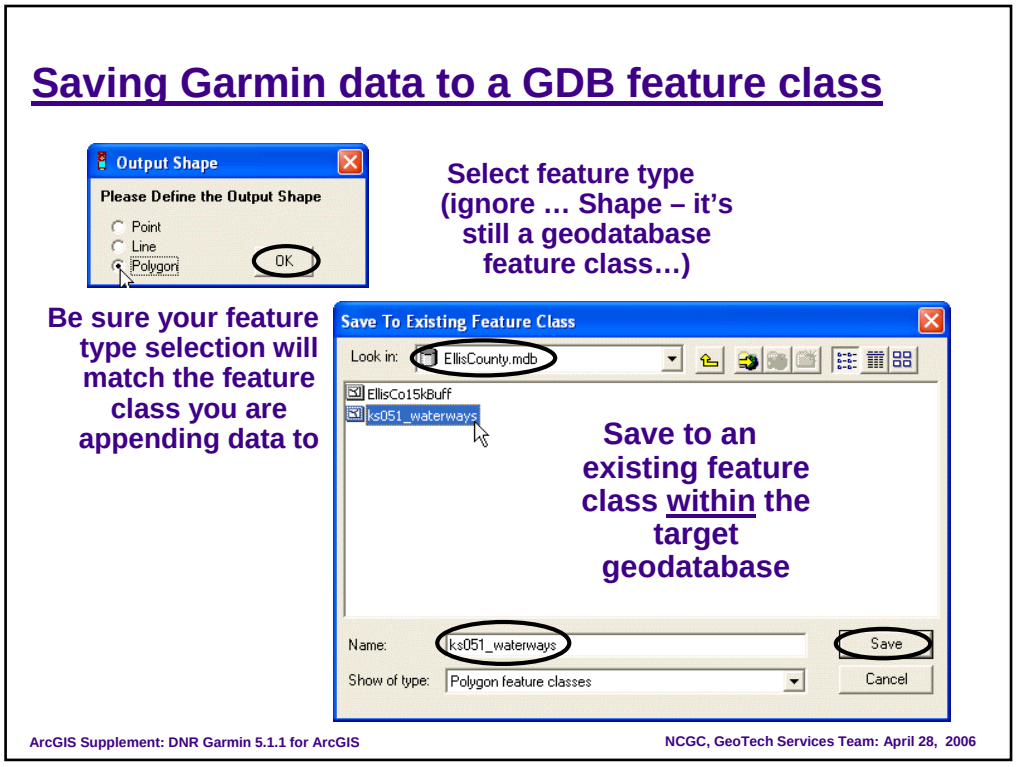
NCGC, GeoTech Services Team: April 28, 2006

Saving Garmin data to a geodatabase feature class

Add the empty geodatabase feature class to your ArcMap session by clicking on the Add Data button located on the standard toolbar. Note that the feature class is empty but a random symbol has been assigned by ArcMap. Also note that the feature class layer is listed in the Table of Contents (TOC) by it's alias name – the alias name assigned when the feature class was created.

On the MN DNR – Garmin / ArcMap dialogue click *File* > *Save to* > *ArcMap* > *Geodatabase Feature Class*.

A new dialogue will appear…



Saving Garmin data to a geodatabase feature class

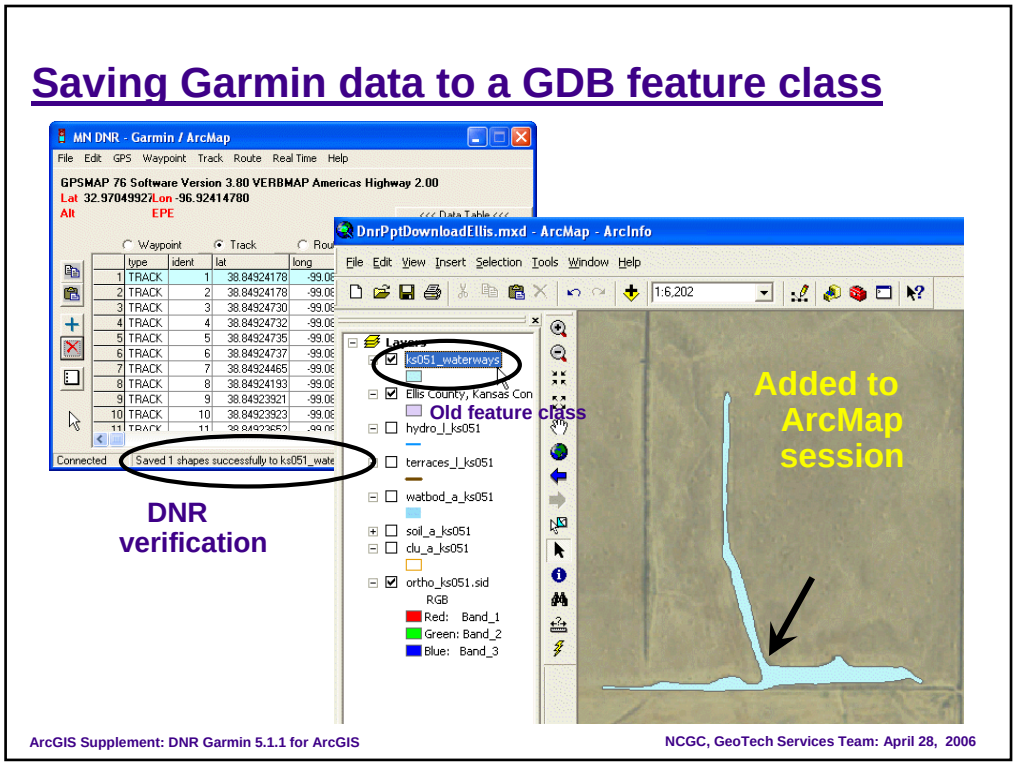
Choose what type of feature class you want to create – a point, a line, or a polygon.

You'll want to make sure you select a feature type that matches the feature class type.

Ignore the fact that the dialogue is called "Output Shape" – it still creates a geodatabase feature class.

When the "Save To Existing Feature Class" dialogue opens you'll want to save to an *existing* feature class in a *target* geodatabase.

Click the Save button to finish saving.

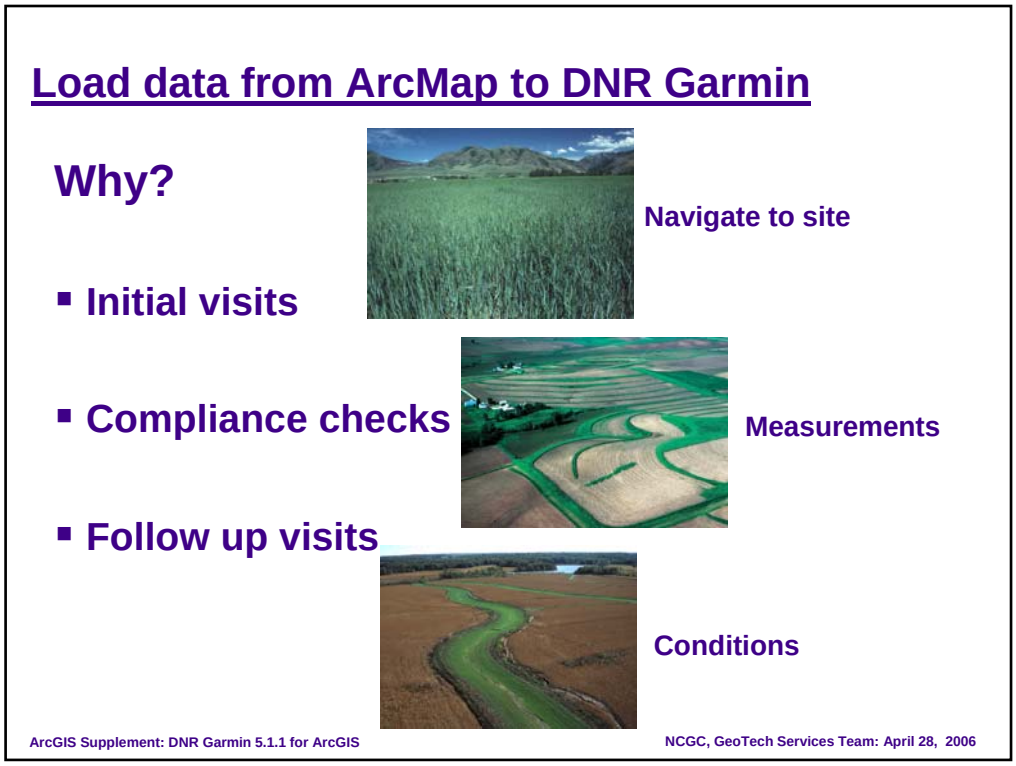


Saving Garmin data to a geodatabase feature class

You'll receive several indications that your Garmin data save to a geodatabase feature class has succeeded:

- Look for a message at the bottom of the MN DNR – Garmin/ArcMap dialogue
- Look in the ArcMap Table of Contents – the feature class name will now be listed as a layer and a new random symbol will be assigned
- Look in the ArcMap data display – the new feature class will appear

Remove the old feature class at your convenience – it is a duplicate entry and is no longer required.



Load data from ArcMap to DNR Garmin

Why would you want to load data from an ArcMap session to DNR Garmin? Because you are going to take that data, upload it to the Garmin GPS receiver, and take it to the field with you.

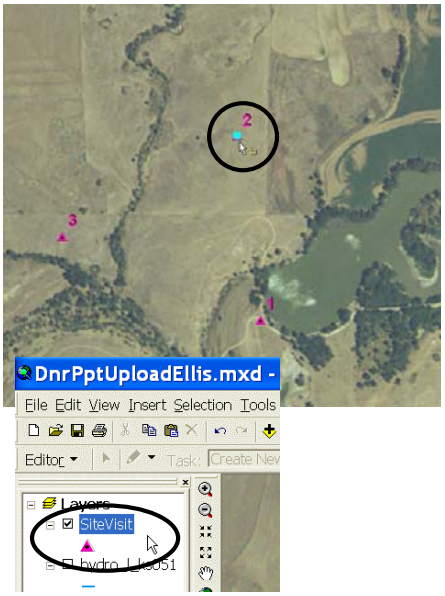
- Initial visits: You may get a call from a client requesting you visit the farm/ranch operation and do some preliminary inventory work or look at some problem areas. The client may not be able to be there with you. If the client has GPS they can give you a coordinate – or they can describe the site, you can find it in the ortho image, and create a point. That point can be sent to a Garmin receiver – and you can use it to navigate directly to the site.
- Compliance checks: You can take measurements with GPS for the conservation plan then return to the site to verify the practice was installed correctly.
- Follow up visits: You can warehouse practice GIS features and monitor the performance of the practices over time – years if need be. You can also inspect easements on a periodic basis for contract compliance.

Select ArcMap point features / layers

- **Select individual features**

OR

- **Select entire layer**



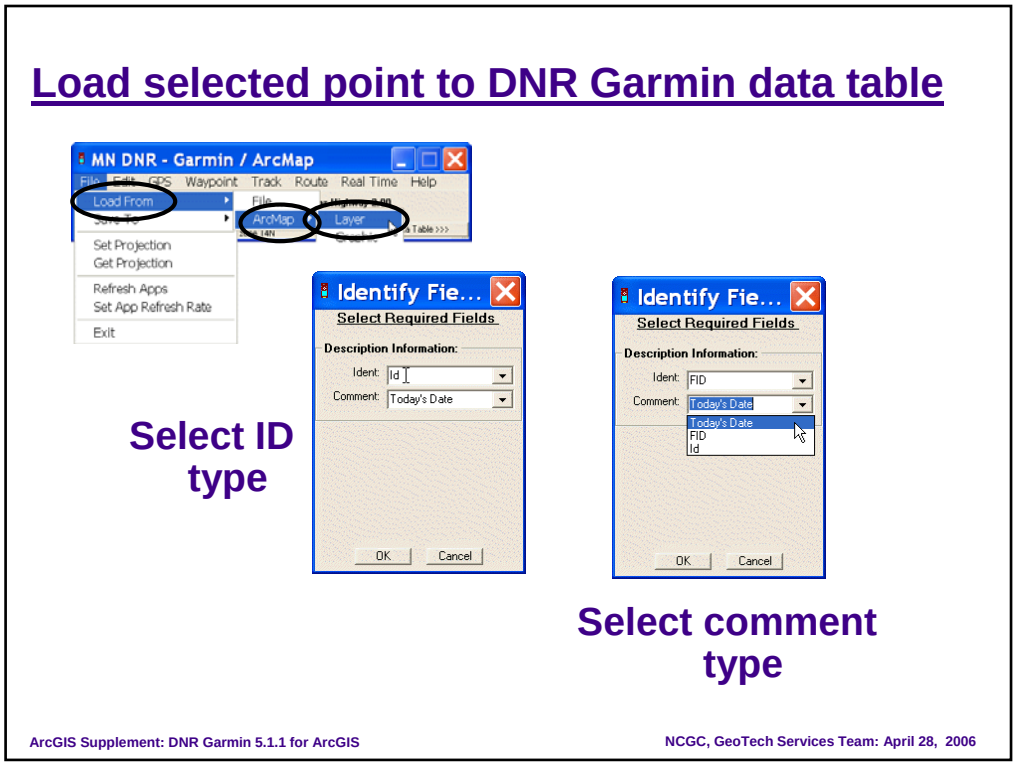
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Select ArcMap point features or layers

You can select individual features in a TOC layer to send to the DNR Garmin data table or or you can send all the data in the layer – the choice is yours.

Use your standard selection tools and too options (MENU > Select or Select Button on the Tools toolbar).



Load selected point to DNR Garmin data table

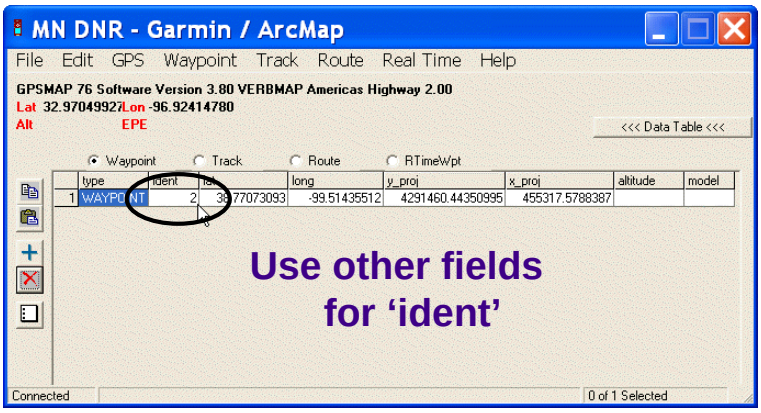
You can send an individual point to DNR Garmin data table by clicking on File > Load From > ArcMap > Layer

An Identify Field dialogue window will appear. First select what field you want to use as the waypoint identifier. Any text field less than 12 characters can be used. In this example we have used the 'ID' field for the identifier (ident field in the data table).

Then select what field you want to use as a comments field. Any text field less than 12 characters can be used.

If you choose to send all the data from a TOC layer you will still see this dialogue.

Load selected point to DNR Garmin data table



ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Load selected point to DNR Garmin data table

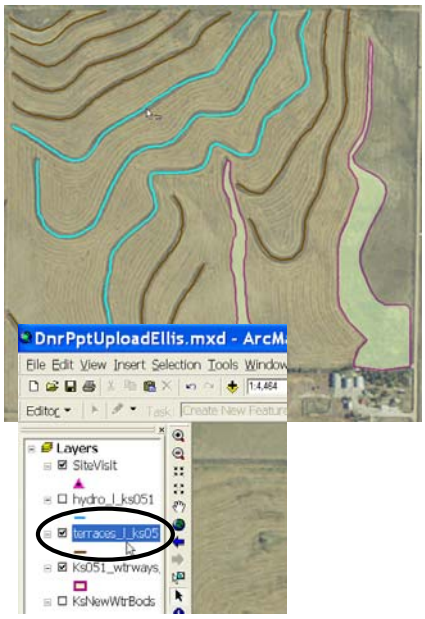
You will see that the selected point with ID = 2 has been sent to the data table.

Select ArcMap line features / layers

- **Select individual features**

OR

- **Select entire layer**



ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

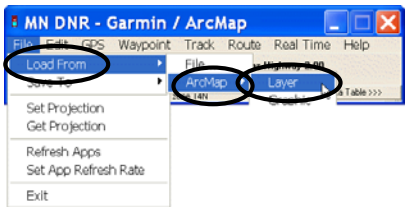
NCGC, GeoTech Services Team: April 28, 2006

Select ArcMap line features or layers

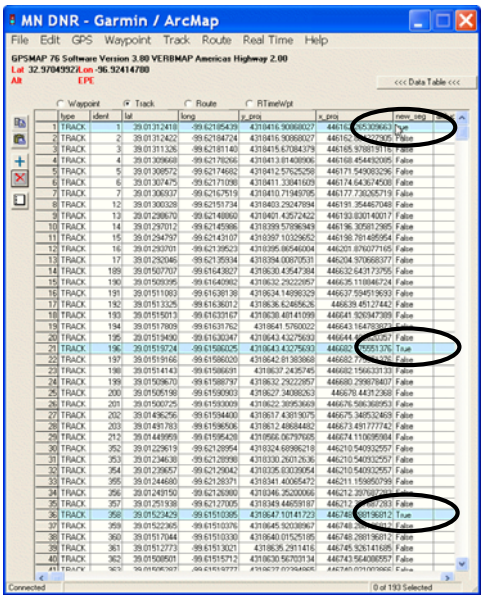
You can select individual or multiple line features in a TOC layer to send to the DNR Garmin data table or or you can send all the data in the layer – the choice is yours. In this case we have selected 3 terraces we want to perform a compliance check on.

Use your standard selection tools and too options (MENU > Select or Select Button on the Tools toolbar).

Load selected line(s) to DNR Garmin data table



Multiple lines are loaded to the data table



ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Load selected line(s) to DNR Garmin data table

You can send the selected lines to DNR Garmin data table by clicking on File > Load From > ArcMap > Layer.

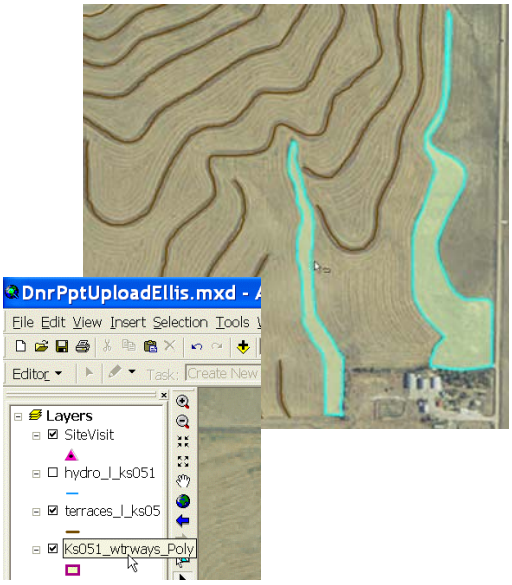
The three lines will be sent as tracks – each track will be separated from the others by an entry of 'true' in the *new_seg* field.

Select ArcMap polygon features / layers

- **Select individual features**

OR

- **Select entire layer**



ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

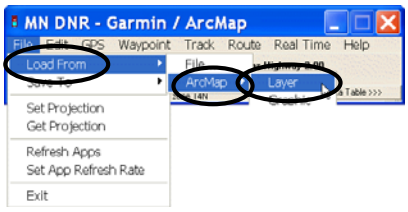
NCGC, GeoTech Services Team: April 28, 2006

Select ArcMap polygon features or layers

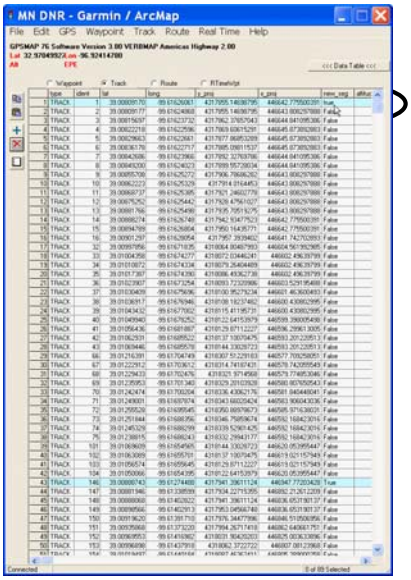
You can select individual or multiple polygon features in a TOC layer to send to the DNR Garmin data table or or you can send all the data in the layer – the choice is yours. In this case we have selected two large waterways we want to check practice condition and performance on.

Use your standard selection tools and too options (MENU > Select or Select Button on the Tools toolbar).

Load selected poly(s) to DNR Garmin data table



Single, multiple, or all polys are loaded to the data table



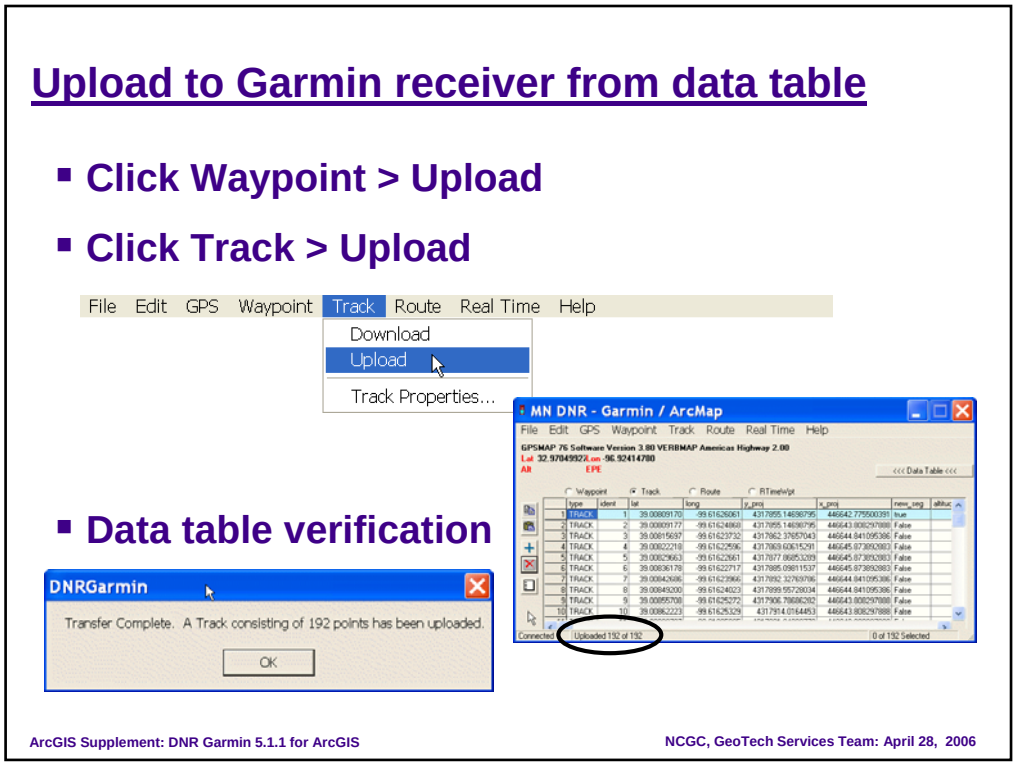
ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

NCGC, GeoTech Services Team: April 28, 2006

Load selected poly(s) or poly layers to DNR Garmin data table

You can send the selected polys to DNR Garmin data table by clicking on File > Load From > ArcMap > Layer.

The two polys will be sent as tracks – each track will be separated from the others by an entry of 'true' in the *new_seg* field.



Upload to Garmin receiver from data table

On the menu click either Waypoint or Track, then Upload.

The Garmin receiver must be turned on and set to Garmin host mode. Set host mode by pressing MENU key on the receiver two times, use the ROCKER key to scroll to “Setup”, then use the right/left ROCKER key to scroll to the “Interface” tab. ROCKER down to the Serial Data Format field, press the ENTER key, and ROCKER to “Garmin” then press ENTER.

Be sure the Garmin PC cable is attached correctly to the receiver and to your computer.

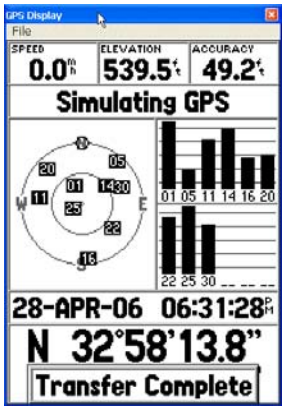
You will see two DNR Garmin verifications when data is completed uploaded:

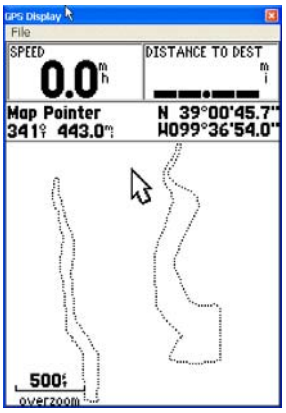
• A dialogue will appear – click OK

• The lower left corner of the data table will display a verification message.

Upload to Garmin receiver from data table

- **Check Garmin Track & Map pages**





ArcGIS Supplement: DNR Garmin 5.1.1 for ArcGIS

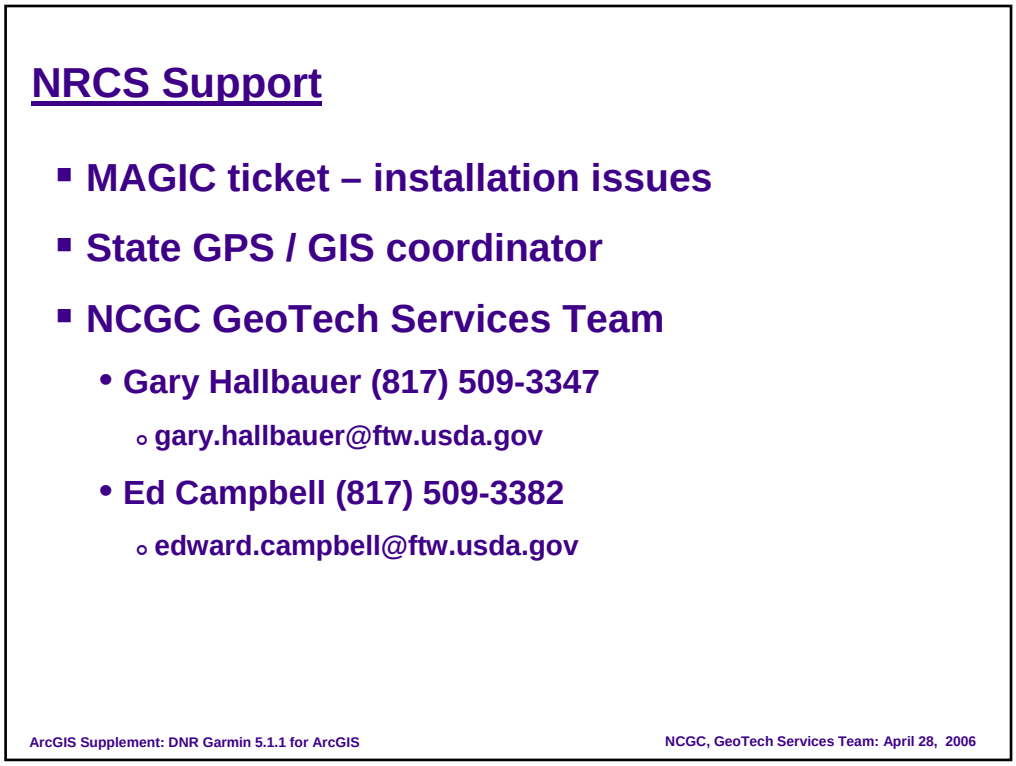
NCGC, GeoTech Services Team: April 28, 2006

Upload to Garmin receiver from data table – receiver verifications

If you have your receiver set to the Satellite page you will see a “Transfer Complete” message appear. If you have the receiver set to beep for messages you will also hear a beeping sound.

Next go to the Track page (MENU, MENU, Tracks). If you emptied your active track log then you will notice that memory has been occupied by new data.

Press PAGE until you get to the Map page. Scroll through the map with ROCKER until you find your uploaded data. Points will display labels from the uploaded ident field.

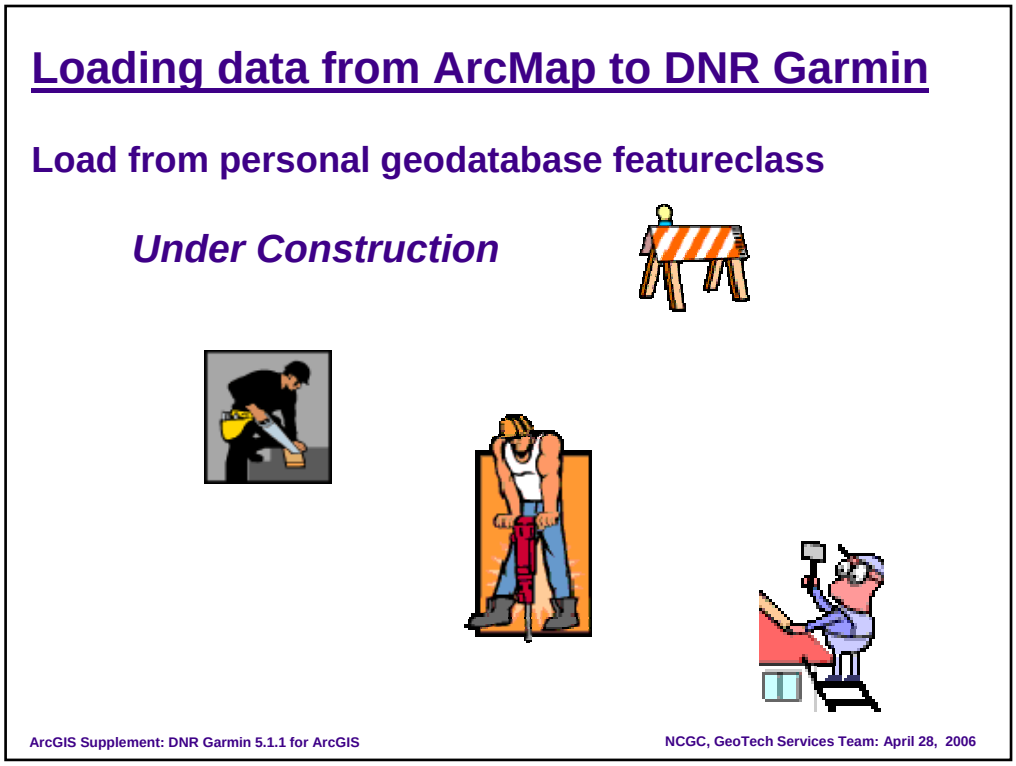


NRCS support for DNR Garmin 5.1.1

Primary support for DNR Garmin 5.1.1 is provided by your state GIS specialist.

Your state GIS specialist may call the NCGC Geospatial Technical Services Team representatives if they can not answer your question. You may call NCGC directly if you can not contact your state GIS specialist. Contact information is provided in this slide.

For installation and hardware problems please submit an ITS MAGIC ticket.



Loading data from ArcGIS to DNR Garmin

This portion of the presentation is under development.